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REVISION OF THE GENUS DAHLIA
(COMPOSITAE, HELIANTHEAE — COREOPSISIDINAE)

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(Continued from page 365)

15. *Dahlia pteropoda* Sherff, Am. Jour. Bot. 34: 147. 1947.

TYPE: MEXICO: PUEBLA: Cerro del Gavilán, 8000-9000 ft., Aug. 1909, *Purpus* 3851 (Holotype: UC!).

Perennial herb at least 7 dm. tall. Stems about 5 mm. diam., deeply 6-furrowed, more or less pilose, densely so at the nodes, internodes 3.5-7 cm. long. Leaves once-pinnate to bipinnatisect, 13-25 cm. long; leaflets 3-9, elliptical, acute (sometimes abruptly narrowed into the short acuminate tip); basal pinnae 3-8 cm. long, 3-5 cm. wide; surfaces slightly bicolored, ventrally glabrous or essentially so, dorsally pilose; margins densely ciliolate, the cilia rigid and sharp, regularly serrate to dentate-crenate, the undissected pinnae with 8-16 teeth per side; stipels sometimes present at the basal and second rachis nodes, broadly ovate, 15-22 mm. long, 14-18 mm. wide; petiole 4-11 cm. long, 1-4.2 cm. wide, broadly auriculate winged, the wings usually coarsely-toothed, more or less glabrous above, pilose beneath; rachis broadly winged 7-12 cm. wide, glabrous above except at the junction with the pinnae where densely pubescent, pilose beneath. Heads in 2's, sometimes 3's, obliquely erect at anthesis; rays light purple, 22-28 mm. long, 8-14 mm. wide, elliptic-ovate, acute or denticulate; outer involucre bracts reflexed at anthesis, obovate, acute, 8-10 mm. long, 1-2.5 mm. wide, glabrous, dorsally reticulate veiny, the 4-8 main veins parallel; inner bracts 11-14 mm. long, 4-6 mm. wide; disc florets yellow; the immature achenes black spotted, slightly spatulate-linear, almost 9 mm. long, 2 mm. or less wide; pappus obsolete or persisting as 2 minute rudiments.

Known only from southern Puebla, 7000-9000 ft. Flowering August.

MEXICO. PUEBLA: vicinity of San Luis Tultitlanapa, *Purpus* 2536 (GH, UC); Cerro del Gavilán, *Purpus* 3852 (Topotype: UC).

The leaves of *Dahlia pteropoda* with their huge auriculate wings at the base of the petioles are so distinctive there can be no confusion with it and any other known species of the genus. The texture of its leaves suggests a close relationship with *D. pinnata*, an opinion also expressed by Sherff (1947).

16. ***Dahlia brevis*** Sorensen, nomen nov. TYPE: MEXICO: MÉXICO: on limestone bluffs at Flor de María, Aug. 1890, *Pringle* 3164 (Holotype: US!; Isotypes: F!, GH!, LCU!, MO!, MSC!, NY!, RSA!, UC!).

Dahlia pubescens S. Wats. Proc. Am. Acad. 26: 142. 1892. Type: based on *Pringle* 3164 as above, non *Dahlia pubescens* A. Brongn. ex Neumann, Rev. Hort. II. 4: 305. 1845 (see excluded species).

Dahlia barkerae sensu Sherff, Am. Jour. Bot. 33: 508. 1946.

Herb 4-7 dm. tall, sparingly branched, growing from very shallow tubers. Stems 2-5 mm. diam., many-striate, pubescent, increasingly hairy at the nodes; median internodes 4-8 cm. long. Leaves sometimes simple but more commonly once-pinnate or once-pinnatisect, rarely bipinnatisect, 3.5-14 cm. long; leaflets or divisions 5-7(-9), opposite, rarely sub-opposite or alternate; the basal pinnae 12-40 mm. long, 4-12 mm. wide, oblong-lanceolate, acute or subacute to almost obtuse; the terminal leaflet or segment smaller than its companions; surfaces light-green or obscurely bicolored, ventrally glabrous or sparingly pubescent, dorsally conspicuously pubescent, especially along the principal veins; margins ciliolate, the cilia very short, stiff and almost cartilaginous, antrorsely curved, entire or irregularly serrate with 1 or 2 teeth per side; stipels absent; petiole 7-22 mm. long, 0.5-4 mm. wide, usually winged from the decurrent bases of its lateral divisions, base of petiole often beset with long, broad-based, multicellular hairs; rachis winged, pubescent, especially at the junction with the leaflets. Heads 1-3, rarely 4-6, per plant, obliquely erect at anthesis, on peduncles 10-24 cm. long; outer involucre bracts erect at anthesis, 6-9 mm. long, 2.5-3 mm. wide, broadly obovate, obtuse, conspicuously purple striate with 5-9 parallel veins; inner bracts 10-14 mm. long, 4-7 mm. wide, conspicuously many purple-lined; rays light purple, spreading at anthesis, 10-25 mm. long, 6-14 mm. wide, elliptical, acute or denticulate; disc florets yellow, corolla with purple veins, lobes purple margined or entirely purple; chaff (in fruit) 12-13 mm. long, 7 mm. wide; achenes 6-7 mm. long, 2-3 mm. wide, broadly spatulate, minutely puberulent; pappus obsolete or consisting of 2 minute tubercles. Chromosome number, $n = 16$.

Moist rocky slopes and rocky ledges, 8500-10,000 ft., northwest México state. Flowering Aug.-Sep.

MEXICO. MÉXICO: At K-167 near Calpulalpan on route 57, México City to San Juan del Río, 3100 m., *Hawkes et al.* 1396 (F); about 10 mi. W. of Atlacomulco at Estación Bassoco along gravel road to El Oro, 9000 ft., *Melchert & Sorensen* 6235 A-E (IA).

The present species was first described by Watson (1891) who chose for it the name *Dahlia pubescens*. It is now clear that the name *D. pubescens* is a later homonym and for this reason I have given the species the new name *D. brevis* alluding to its diminutive habit.

As is evident in the list of synonyms above, the name *Dahlia barkerae* sensu Sherff (1946, 1955, 1962, 1966) was used with reference to this species. It is clear from the materials at hand and from my observations of living plants both in the field and in cultivation that such usage was incorrect. The name *D. barkerae* Knowles & Westcott is correctly referable to the taxon which Sherff (1946) had described as the new variety *D. scapigera* var. *arsenei* (see table 2).

On the texture, color and shape of its leaves, *Dahlia brevis* strongly resembles a dwarfed *D. pinnata* sensu stricto. *D. pinnata* may be distinguished by its greater height, outer involucre bracts reflexed at anthesis, larger leaves, larger heads and chromosome number of $n = 32$.

Several specimens of *D. brevis* I have examined were previously identified as species of *Cosmos* and vice versa. *Cosmos* species are, however, easily distinguished by the tufts of hairs on their filaments and their 4-angled (not obcompressed) achenes.

17. ***Dahlia rudis*** Sorensen, sp. nov. TYPE: MEXICO: DISTRITO FEDERAL: Salazar (a railroad station SW. of Mexico City), 2800 m., Sep. 1941, *Lyonnet* 3372 (Holotype: US!).

Herba parennis, 9-30 dm. alta. Folia plerumque pinnata, interdum bipinnata, 16-25 cm. longa; foliolis sessilibus vel petiolulatis 9-25 mm. longa; pinnis basilaribus 11-15 cm. longis, 2.5-5 cm. latis, foliolis ter-



Plate 1419

Fig. 5. *Dahlia rudis* Sorensen. Photograph of type (US), $\times 1/3$.

minalibus ovato-lanceolatis, longo-acuminatis vel attenuatis; nervo medio dorsaliter stramineo; marginibus regulatim serratis cum dentibus in quoque latere 10-16; stipellis in rachidis nodis basilaribus et interdum secundis affixis; petiolo valde lunato in sectione transversale, alato saepe pinnis basilaribus decurrentibus, basi valde amplexicaule praesertim ad apicem plantae. Capitula solitaria vel in binis vel trinis, pedunculis 7-16 cm. longis; involucri squamis exterioribus reflexis sub anthesi, 15-25 mm. longis, 4-10 mm. latis, dorsaliter 6-10-nervis, interdum intervenium reticulatis. Flores ligulati lilacini, 2-3 cm. longi, 1-1.5 cm. lati. Fig. 5.

In high mountains, 8600-10,000 ft., from near Amecameca in eastern México state westward in northern Morelos, Distrito Federal, and to the vicinity of Temascaltepec, southwestern México state. Flowering Aug.-Oct.

MEXICO. HIDALGO: 10 km. NNE of Apam, *West* H-5 (WIS). MEXICO: Distr. of Temascaltepec, *Hinton* 1885 (MO, US), 8332 (GH, US); Amecameca, *Kuntz* 23660 (NY); Criadero, *Matuda* 19411 (MEXU, US); W. of Transfiguración, *Russell & Souviron* 215 (US); Cerro del Pueblo de Hoacalco de Cuautitlán, *Salasar s.n.* (MEXU). MORELOS: Lago Zempoala, *Matuda* 25575 (MEXU, NY); from cultivation: UNITED STATES. CALIFORNIA: grown from Mexican seed at Golden Gate Park, *Walther s.n.* (CAS).

Among the specimens of *Dahlia rudis* cited above only two have labels providing information on the height of the plants (3 ft. & 3 m.), only one gives its habit (herb) and none provide what appear to be median leaves. The accompanying description must, therefore, be considered provisional.

Certain characteristics of *Dahlia rudis* suggest a relationship to the "tree-dahlias," the leaflets with long attenuate apices and tan colored midveins on the undersurface and the large, often reticulately-veined, outer involucre bracts. Several of the specimens have, in fact, been identified with names of "tree-dahlias" as *D. maximiliana*, and *D. excelsa*.

Dahlia rudis is distinguished by its conspicuous sheathing petioles (of the upper leaves) and its very large outer bracts. Most specimens show relatively few heads per branch (2-4) but one, at least, shows several more buds rather close to anthesis.

18. **Dahlia moorei** Sherff, Bot. Leafl. 5: 22. 1951. TYPE: MEXICO: HIDALGO: near K-238 along route 85, limestone ledges and streamside thickets, Barranca de San Vicente, 1800-2000 m., 24 Sep. 1941, *H. E. Moore* 5068 (Holotype: F!; Isotypes: BH!, GH!, UC!).

Herb 18-25 dm. tall. Stem 5-8 mm. diam, drying to reddish-brown or tan, many-striate, glabrous; internodes 12-21 cm. long, hollow. Leaves bipinnate, 20-30 cm. long; leaflets 5-9, the basal pinnae 14-17 cm. long, sessile or stalked, the petiolules 12-30 mm. long; ultimate segments opposite or alternate on the rachilla, 3.5-7 cm. long, 1.5-2.3 cm. wide, ovate-lanceolate, apices long-attenuate or flagelliform; surfaces slightly bicolored, lighter green beneath, ventrally pubescent, the hairs occurring between the veins, dorsally puberulent, the hairs following the veins; margins ciliolate, the cilia slender and flexuous, coarsely and regularly serrate, the terminal leaflet with 10-18 teeth per side; stipels present at the basal and second nodes on the rachis, 1.5-4 cm. long, 0.8-2 cm. wide; petiole 2-12 cm. long, glabrous, crescent-shaped in cross-section, longitudinally grooved above; rachis glabrous except at the junction with the pinnae. Heads subnumerous, 6-12 per main branch, obliquely erect, on peduncles 4.5-16 cm. long; outer involucre bracts reflexed at anthesis, 10-17 mm. long, 1.5-4 mm. wide (near the base), linear-lanceolate, becoming long-attenuate or flagelliform, glabrous, dorsally 5-8-lined, ventrally sometimes strongly cross-wrinkled; inner bracts 13-15 mm. long, 4-7 mm. wide; rays deep rose-purple, 2-2.6 cm. long, 10-14 mm. wide, elliptical, acute or denticulate; disc florets yellow below, purple above; style branches purple; anthers yellow with purple veins; achenes linear-spatulate, glabrous or puberulous, many-sulcate, 6.5-7 mm. long, 1.3-1.6 mm. wide, constricted slightly below the summit to form a black disc less than 1 mm. wide and barely 0.4 mm. high, pappus obsolete or consisting of 2 minute rudiments.

Known only from the type locality in the Barranca de San Vicente, Hidalgo. Flowering Aug.

MEXICO. HIDALGO: Near K-238 along route 85, Barranca de San Vicente between Zimapán & Jacala, *Moore & Wood* 4441 (Topotypes: A, BH, NY, UC, WIS).

Certain floral characteristics found in *Dahlia moorei* such as the purple style branches and the thickened, black apical achenial disc are unique among the dahlias. Its long-attenuate, almost flagelliform outer involucre bracts are like those of *D. hintonii* but in that species the bracts are dorsally pilose, not glabrous. The leaves of *D. moorei*, with

ovate-lanceolate leaflets, their apices long acuminate and margins evenly serrate, resemble those of *D. rudis* from which it is distinguished by its flagelliform (not broadly obovate or oblanceolate) outer bracts and its large number of heads (6-12 not 1-4) per branch.

19. ***Dahlia hintonii*** Sherff, Am. Jour. Bot. 34: 138. 1947.
 TYPE: MEXICO: GUERRERO: Distrito de Minas, Toro Muerto, on boulder in pine forest, 2150 m., 27 July 1939, *Hinton et al.* 14499 (Holotype: GH!; Isotypes: MICH!, NY!, UC!, US!).

Herb 10-15 dm. tall. Stems unusually slender, 2 mm. or less diam., tan, glabrous or a few soft hairs at nodes. Sub-median⁶ leaves petiolate, once-pinnate, 11-17 cm. long; leaflets 3-5, basal pinnae 5-8.5 cm. long, 1-2 cm. wide, lanceolate, becoming long-acuminate or attenuate; surfaces slightly bicolored, dorsally lighter green, the upper glabrous or essentially so, the lower densely pilose; margins finely ciliate, the cilia antrorsely curved, regularly or irregularly serrate, 3-7 teeth per side; stipels absent; petiole 1-3 cm. long, puberulent, crescent-shaped in cross section, grooved above; rachis pubescent, increasingly so at the junction with the primary pinnae. Heads 4-8 per branch, erect or obliquely erect; outer involucrel bracts linear or slightly linear-spatulate, reflexed at anthesis, 11-20 mm. long, 1-2 mm. wide, dorsally pilose, ventrally pubescent, becoming almost glabrous near tips; inner bracts 13-16 mm. long, 4.5-7 mm. wide, pubescent in the middle, glabrous toward margins; rays ovate, acute or denticulate, 13-18 mm. long, 8-10 mm. wide, said to be purple; disc florets yellow with lobes of the corolla dark; achenes not seen.

Known only from the type locality in south-central Guerrero, just west of Cerro Teotepec. Flowering July.

Certain distinctive characteristics of *Dahlia hintonii* are unique in the genus. Its once-pinnate leaves are composed of unusually narrow, lanceolate leaflets 3-5 times longer than wide and its rather long and slender outer involucrel bracts are minutely but densely pubescent.

20. ***Dahlia mollis*** Sorensen, sp. nov. TYPE: MEXICO: HIDALGO: 12 mi. S. of Jacala, 1 m. S. of Minas Viejas, along route 85, about 7800 ft., 30 Aug. 1965, *Melchert & Sorensen* 6209 (Holotype: IA!).

⁶No median leaves present on *Hinton* 14499.

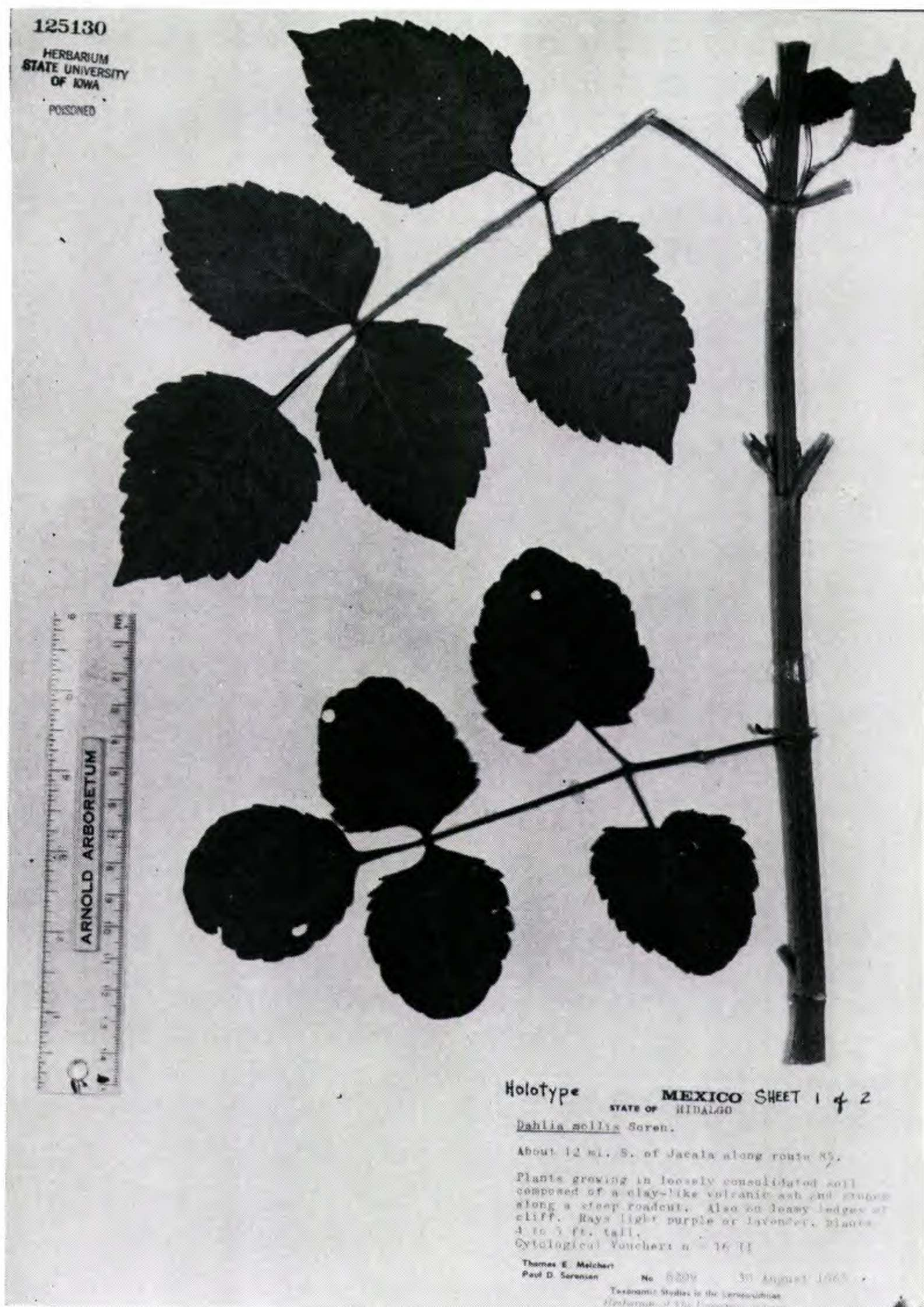


Plate 1420

Fig. 6. *Dahlia mollis* Sorensen. Photograph of type (IA), $\times 1/3$.

Herba perennis, 10-16 dm. alta. Caules omnino dense pubescentibus, nodis copiose pilos. Folia pinnati, 13-29 cm. longi, foliolis 3-5, pinni basilaribus 4-11 cm. longis, 3.5-5 cm. latis, late ovatis, apice acutis, basi contractis vel rotundatis (foliolis terminalis interdum basi truncatis vel subcordatis), ventraliter pubescentibus, pili brevis, dorsaliter subtomentosis; marginibus dense et conspicue ciliatis, serrato-crenatis, dentibus, in quoque latere 7-12; stipellis absentibus; rhachi et petiolo pubescentibus, nodis rhacheos floccosis. Capitula in binis vel trinis, pedunculis glabris, 3.5-14 cm. longis; involucri squamis exterioribus effusis vel reflexis sub anthesi, 7-11.5 mm. longis, 3-3.6 mm. latis, dorsaliter 5-9 nervis, glabris. Flores ligulati lilacini, 2.7-3.5 cm. longi, 12-18 mm. lati. Chromosomatum numerus: $n = 16$. Fig. 6.

Rocky slopes and ledges, 7800-8400 ft., western Hidalgo, México. Flowering Aug.-Sep. Map 5, open circles.

MEXICO. HIDALGO: 13 to 14 mi. S. of Jacala, 2 mi. S. of Minas Viejas along route 85, 8000 ft., *Melchert & Sorensen* 6210 A-C (IA), *Melchert et al.* 6504 (IA); trail from Zimapán to mines of El Monte, 7800-8400 ft., *Moore & Wood* 4469 (BH).

The most distinctive feature of *Dahlia mollis* is the dense pubescence of the dorsal leaf surface. Only one other species in the genus, *D. hintonii*, has leaves that are as velvety and soft to the touch. The shape and size of the leaflets of the two are quite distinct, those of *D. hintonii* being narrowly lanceolate and smaller.

The shape and size of the leaves of *Dahlia mollis* resemble those of *D. barkerae*, but in that species the upper surface is dark, glossy green and rugose and the lower surface is not nearly so tomentose. Furthermore, plants of *D. barkerae* are much smaller (3-7 dm. tall) and have a higher chromosome number ($n = 32$).

21. ***Dahlia atropurpurea*** Sorensen, sp. nov. TYPE: MEXICO: MÉXICO: 4 mi. SE. of Sultepec on Cerro Cualtepec, about 8500 ft., 27 Sep. 1966, *Melchert, Sorensen & Crawford* 6498 (Holotype: IA!).

Herba perennis, 15-22 dm. alta. Folia pinnata ad bipinnata, 16-25 cm. longa; foliolis primariis 5-7, pinnis basilaribus ovato-lanceolatis, 6-13 cm. longis, 2.3-3.8 cm. latis, petiolulatis 1.3-3 cm. longis, apice longo-acuminatis, basi rotundatis; paginis bicoloribus, dorsaliter pallido-viridibus vel cano-viridibus, parce pubescentibus, praesertim ad nervos, ventraliter glabris, rugosis; marginibus serrato-crenatis,

dentibus in quoque latere 6-10; petiolis 2.4-5.5 cm. longis; stipellis nodis in basilibus et medianibus rhachidibus affixis. Pedunculis 6.5-11 cm. longis; exterioribus involucri squamis reflexis sub anthesi, 5-9.5 mm. longis, 3-5 mm. latis, dorsaliter et nervis purpureis 5-9, glabris, ventraliter parce adpresso-pubescentibus vel glabris. Flores ligulati atropurpurei vel atropurpureo-nigri, 2.2-3.5 cm. longi; flores tubulosi lutei vel lutei cum apicibus purpureis. Chromosomatum numerus: $n = 32$. Fig. 7.

Known only from the type locality, about 8500 ft., on Cerro Cualtepec near Sultepec, México state and from near Chiriagua, Distr. of Minas, Guerrero. Flowering Sep.

MEXICO. GUERRERO: Chiriagua, distr. of Minas, 2140 m., *Hinton et al.* 10665 (GH).

Several characteristics of *Dahlia atropurpurea* distinguish it from other species or species complexes in *Dahlia*. Its rays, which dry to a dark, almost blackish purple, are not found in any other of the purple-rayed species except *D. cardiophylla* from which it is easily separated by its compound (not simple) leaves.

Dahlia atropurpurea is sympatric with *D. pinnata* and *D. rudis*, two species with which it might possibly be confused. Each of these species is distinguished by its leaf characteristics. The leaves of *D. atropurpurea* are characterized by: (1) drying to a firm and smooth (not coarse nor scabrous) texture, (2) the absence of wings on the rachis, petiole, and petiolules, (3) the 6-10 teeth per margin and (4) the rounded (not attenuate-narrowed) bases of the petiolulate leaflets. The rather coarse-textured, sometimes scabrous leaves of *D. pinnata* are winged, often strongly so, on the rachis, petiole and petiolules and their leaflet bases are attenuate-narrowed. The leaves of *D. rudis* dry to a smooth texture but are rather flexible and thin and their leaflets are attenuate-narrowed at the base and have 10-16 teeth per margin. *D. rudis* is further distinguished from *D. atropurpurea* by its larger outer involucre bracts (15-25 mm. not 5-9.5 mm. long).

On leaf dimensions and segmentation there is considerable overlap between *D. atropurpurea* and the *D. australis-sherffii* species complex. In addition to their geographic

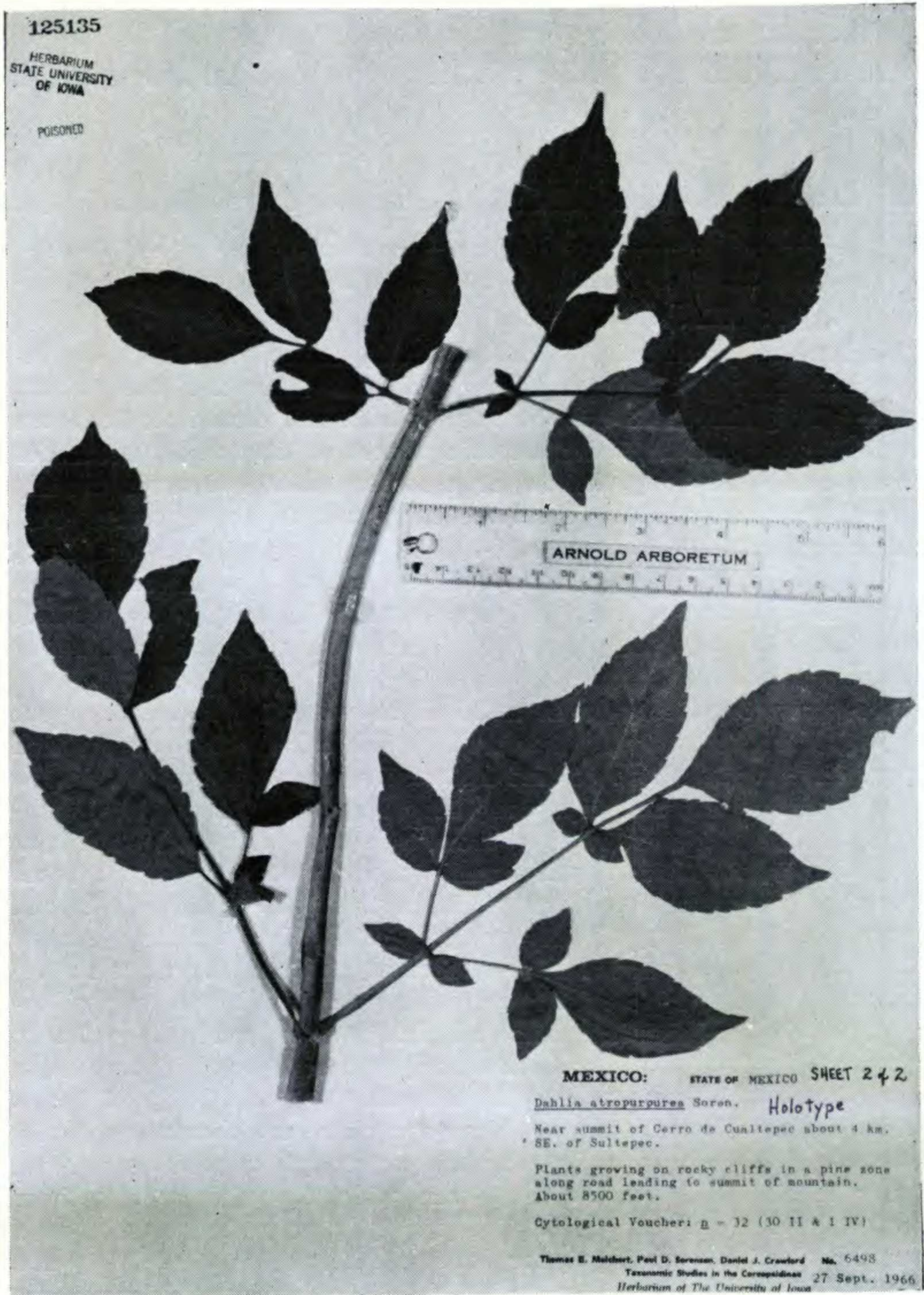


Plate 1421

Fig. 7. *Dahlia atropurpurea* Sorensen. Photograph of type (IA),
 × 1/3.

distinctions the latter species are best distinguished on the nature of their attenuate-narrowed (not rounded) leaf bases.

22. ***Dahlia australis*** (Sherff) Sorensen, comb. & stat. nov.

TYPE: MEXICO: OAXACA: Cerro de San Felipe, 2500 m., 1 Sep. 1897. *Conzatti & Gonzales* 543 (Holotype: GH!).

Herbaceous perennial, 4.6-12.3 dm. tall, branching freely or unbranched except in the flowering portion. Stem 2-6 mm. diam., essentially glabrous to conspicuously pubescent, sometimes scabrous on the lower portions, hairs becoming dense at the nodes; internodes 3.5-24(-28.5) cm. long, hollow or sometimes solid. Leaves usually once-pinnate but ranging from merely pinnatifid to bipinnate, 3-21 cm. long; primary leaflets 3-5(-7), basal pinnae 1.5-9.5 cm. long, ultimate segments oblong or rhombic-ovate to ovate-lanceolate, apex acute or acuminate, base attenuate-narrowed, sessile or stalked, petiolule 1-13 mm. long, terminal leaflet often 3-lobed, sessile or pseudopetiolate; surfaces usually bicolored, green or dark green above, gray or silvery-green and salient veiny beneath, the upper rugose, glabrous or with a few scattered hairs near the margins and apex, often with a line of fine hairs along the principal veins, the lower usually pubescent esp. along the veins; margins ciliate, regularly or irregularly serrate to crenate-dentate with 2-10 teeth per side, slightly revolute; stipels usually present, attached at the basal (rarely also at the second or median) rachis node; petiole 0.9-10 cm. long, sometimes very slightly winged in the distal parts, grooved above and crescent-shaped in cross-section, almost glabrous to noticeably pubescent; rachis usually narrowly winged, glabrous or pubescent, the hairs becoming dense at the junction with the primary pinnae. Heads solitary or in 2's and 3's, erect or obliquely erect; outer involucral bracts reflexed at anthesis, 7-15 mm. long, 1.5-6 mm. wide, linear-oblong to oblong-spatulate or obovate, dorsally glabrous, 4-8-lined, ventrally sometimes minutely appressed pubescent; inner bracts 10-18 mm. long, 3-9 mm. wide, brownish or sometimes suffused with purple at the tips, rarely purple throughout; rays purple; chaff resembling inner bracts; disc florets 39-67, 6-9 mm. long, the limb ranging from yellow throughout to purple throughout with many intermediates, corolla lobes often reflexed or revolute at anthesis; style branches long attenuate, 2.5-3.2 mm. long, less than 0.8 mm. wide; achenes (derived from greenhouse plants) 7-11.4 mm. long, 2-3 mm. wide, linear-oblong to obovate, blackish or speckled gray; pappus obsolete or consisting of 2 minute rudiments. Chromosome numbers, $n = 16$ & 32.

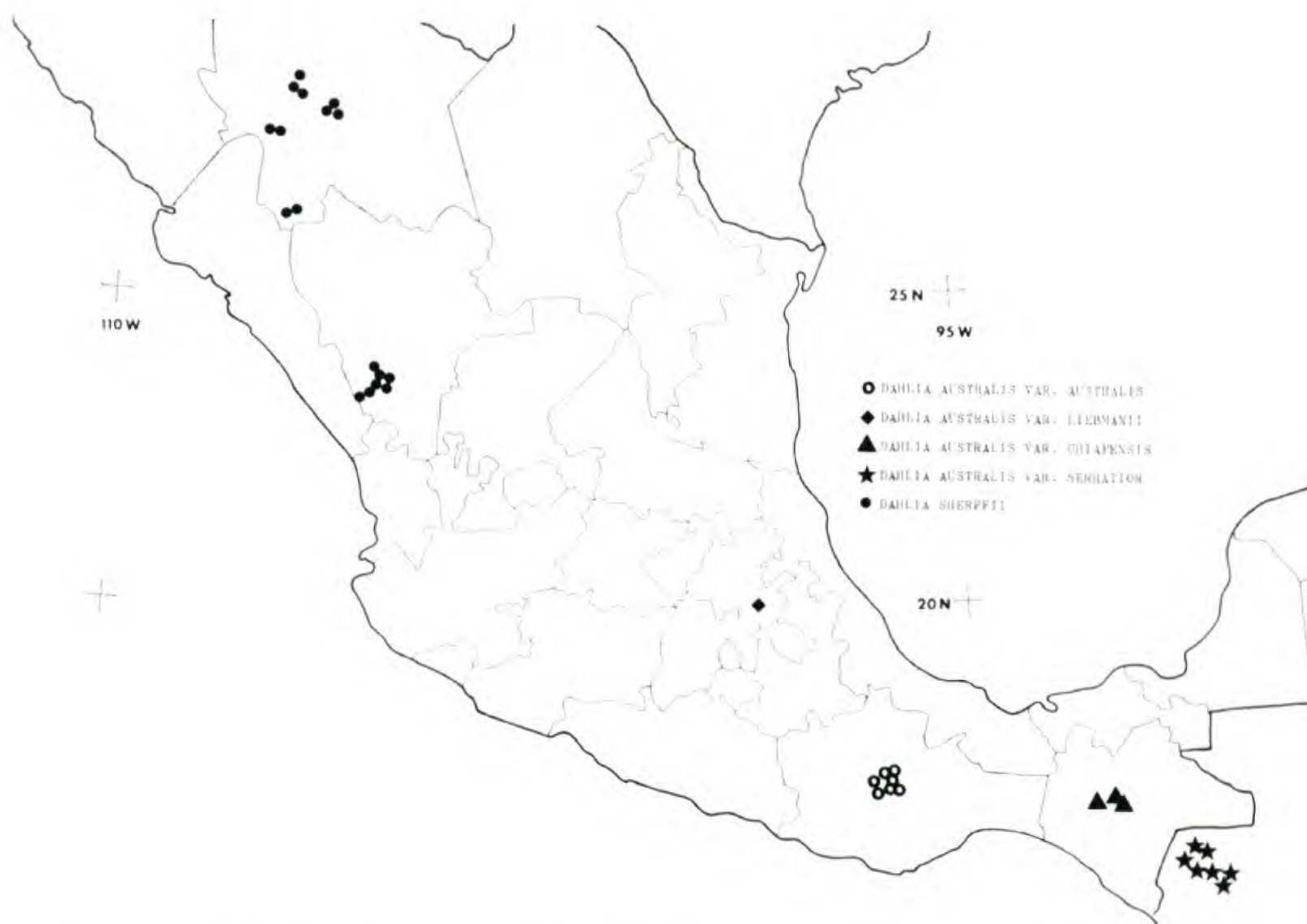
As treated here *Dahlia australis* (Sherff) Sorensen is composed of four infraspecific taxa as outlined and described below. These are var. *australis*, var. *chiapensis*, var. *serrator*, and var. *liebmannii* (see Table 2). Each of these is geographically isolated (see Map 6) and, to a limited extent, morphologically distinct. Excepting var. *liebmannii*, a little-known taxon marked by its rather small leaves and short petioles, none of the varieties is easily distinguished on any single morphologic feature. Their distinguishing characteristics are primarily of a quantitative nature and are discussed in turn following the taxonomic treatments of each variety. For the convenience of the user, the following key to the infraspecific taxa of *Dahlia australis* is provided.

- A. Petiole 0.9-1.3 cm. long; leaves 3-8 cm. long. 22b. *D. australis* var. *liebmannii*.
- A. Petiole (2-)3.8-10 cm. long; leaves 7.5-21 cm. long.
 - B. Plants mostly of a compact growth habit with median internodes (1-)3-15 cm. long, stems with leaves often inferiorly clustered; outer involucral bracts 7-12 mm. long.
 - C. Terminal leaflet often 3-lobed, sessile with strongly decurrent margins forming a pseudopetiolule; leaflets (of 1-pinnate leaves) oblong-ovate, markedly bicolored, the lower surface much lighter or silvery green. 22a. *D. australis* var. *australis*.
 - C. Terminal leaflet usually not lobed nor divided and without strongly decurrent margins forming a pseudopetiolule; leaflets (esp. the terminal one) often narrowly rhombic-ovate, not strongly bicolored, the lower surface rarely markedly lighter or silvery-green. 22c. *D. australis* var. *chiapensis*.
 - B. Plants mostly taller growing with longer internodes (7-)13-19 (-28.5) cm. long, stems leafy; outer involucral bracts (9-) 12-15 mm. long. 22d. *D. australis* var. *serrator*.

Dahlia australis is apparently quite closely related to *D. sherffii* of Durango and Chihuahua of northwestern México (see Map 6). Indeed, attempts to derive artificial hybrids between them have been highly successful. The hybrid plants are very robust, flower the first season of growth, possess no visible deleterious irregularities at ana-

phase and produce virtually 100% stainable pollen (using cotton-blue dissolved in lactophenol).

Although geographically isolated by about 900 miles, there is a considerable amount of morphological overlap between the taxa comprising the *Dahlia australis-sherffii* species complex. For example, a few individuals of *D. sherffii* display the markedly bicolored leaves which characterize *D. australis*. Similarly, the leaves on a few specimens of *D. australis* have upper leaf surfaces just as pubescent as those typically found in *D. sherffii*. Also, the dimensions and, to a limited extent, the segmentation of leaves and leaflets of both species overlap completely, and both produce leaflets rather attenuate-narrowed (not rounded) at the base.



Map 6. Distribution of the *Dahlia australis-sherffii* species complex: *Dahlia australis* var. *australis* (Sherff) Sorensen, open circles; *Dahlia australis* var. *liebmannii* (Sherff) Sorensen, diamond; *Dahlia australis* var. *chiapensis* Sorensen, triangles; *Dahlia australis* var. *serrator* (Sherff) Sorensen, stars; *Dahlia sherffii* Sorensen, closed circles.

Dahlia australis is distinguished from *D. sherffii* (1) by its markedly bicolored leaves which are much lighter, almost silvery-green beneath, (2) by the mostly glabrous (not pubescent) and rugose (not smooth) upper surface of its leaves, and (3) by its sometimes slightly revolute (not flattened) leaflet margins.

22a. ***Dahlia australis*** (Sherff) Sorensen var. ***australis***,
 TYPE: MEXICO: OAXACA: Cerro de San Felipe,
 2500 m., 1 Sep. 1897, *Conzatti & Gonzalez* 543 (Holo-
 type: GH!).

Dahlia scapigera var. *australis* et f. *australis* Sherff, *Am. Jour. Bot.*
 34: 143. 1947. Type: that of *Dahlia australis* var. *australis*.

Dahlia scapigera var. *australis* f. *purpurea* Sherff, *Ibid.* p. 145. Type:
Conzatti & Gonzalez 402, Oaxaca, México (Holotype: GH!).

Herbaceous perennial 7-12 dm. tall. Stem 2-5 mm. diam., glabrous or pubescent; internodes 3.5-12 cm. long. Leaves usually once-pinnate but ranging from pinnatifid to bipinnate, 7.5-21 cm. long; basal pinnae 2-9.5 cm. long, sessile or rarely stalked, petiolule 10-13 mm. long, terminal leaflet often 3-lobed, sessile or pseudopetiolate; surfaces conspicuously bicolored, green or dark green above, gray or silvery-green and salient veiny beneath, the upper rugose, glabrous or with a few scattered hairs near the margins and apex, the lower pubescent, esp. along the veins; margins irregularly serrate to crenate-dentate, 2-10 teeth per side, slightly revolute; petiole 2-8 (-10) cm. long. Heads with outer involucre bracts 7-12 mm. long, 1.5-3 mm. wide, narrowly oblanceolate; rays purple, 2.8-3.5 cm. long, about 1.5 cm. wide, ovate acute; disc florets 39-67, 6-9 mm. long, the limb from yellow throughout to purple throughout with many intermediates, corolla lobes often reflexed or revolute; achenes 8-9 mm. long, 2.8-3 mm. wide, linear-oblanceolate. Chromosome numbers, $n = 16$ & 32.

Known only from ledges and rocky slopes at altitudes of 7000 to 11,000 ft. in the vicinity of Cerro de San Felipe and Cerro Zempoalteptl, north-northeast and northeast of Oaxaca City, Oaxaca, México. Flowering June-Oct. Map 6, open circles.

MEXICO. OAXACA: summit and slopes of Cerro de San Felipe near Ciudad Oaxaca, *Conzatti* 55 (GH, US), 4078 (MEXU), 544 (GH, US), *Nelson* 1161 (US), *Pringle* 5620 (GH, MEXU), *C. L. Smith* 294 (IA); various localities from about 12 to 48 mi. N. of Ciudad Oaxaca along route 175 to Valle Nacional, *Cronquist* 9655 (MEXU, MICH, NY, TEX), *King* 2076 (MICH), *Krueger & Gillespie* 35 (CAS, GH, MO),

Melchert & Sorensen 6173 A-C (IA), 6174 A-G (IA), 6184 (IA), 6185 A-D (IA), 6192 A-E (IA), Roe & Roe 2004 (A, WIS); slopes of Cerro Zempoalteptl, Hallberg 896 (MICH), Nelson 640 (US).

Sherff (1947, 1955) established *Dahlia australis* var. *australis* as var. *australis* of *D. scapigera* sensu lato (see Table 2). Within his var. *australis* he described two subvarietal taxa, f. *australis* with yellow disc florets and f. *purpurea* with purple disc florets. In the present treatment Sherff's var. *australis* has been separated from *D. scapigera* sensu stricto (see Table 2) and elevated to the rank of species. Moreover, neither of the two color forms recognized by him are treated as separate taxonomic units inasmuch as the intensity and the amount of the disc corollas so colored varies from plant to plant within a single population.⁷

Dahlia australis var. *australis* is the only taxon within this species for which cytological information is available. In this regard, it is a rather interesting taxon because among the purple-rayed dahlias it is the only one represented by both diploid and tetraploid races. During August 1965, Dr. Thomas Melchert and I sampled 5 populations (representing 12 individual chromosome counts) along a 41-mile stretch of highway (route 175) leading northeast from Oaxaca City to Valle Nacional: at mile 12 we counted $n = 32$ (6173); at mile 15, $n = 32$ (6174); at mile 17, $n = 16$ (6184); at mile 21, $n = 32$ (6185); and near mile 41, $n = 16$ again (6192). To date I have been unable to detect morphologic markers which would distinguish the diploid and tetraploid populations or individuals.

Morphologically, the Oaxacan *Dahlia australis* var. *australis* is distinguished from its allied varieties by several characters of its leaves: (1) surfaces markedly bicolored, much lighter green, almost silvery-green beneath, the upper noticeably rugose, glabrous, or with a few scattered hairs near the margins and apex, the lower often strongly reticulate veiny, pubescent, esp. along the principal veins; (2)

⁷Similar color variation is met with in several other *Dahlia* spp., *D. merckii*, *D. sherffii*, *D. brevis*, *D. imperialis*, and *D. dissecta*.

the terminal leaflet often 3-lobed, sessile or pseudopetiolate; (3) the basal leaflet of 1-pinnate leaves oblong-obovate; (4) margins crenate-dentate, the teeth often protruding slightly beyond the outline of the blade.

- 22b. *Dahlia australis* var. *liebmannii* (Sherff) Sorensen, comb. nov. TYPE: MEXICO: HIDALGO (?): between San Andres and San Miguel, Oct. 1842, *Liebmann* 688 (=9782) (Holotype: F!; Isotype; US!). *Dahlia scapigera* var. *liebmannii* Sherff, Am. Jour. Bot. 143. 1947. Type: that of *Dahlia australis* var. *liebmannii*.

Herb, at least 4.6 dm. tall. Stems 2-3.5 mm. diam., glabrous or sparsely pubescent with a few scattered soft hairs; internodes 14-24 cm. long. Leaves once-pinnate, 3-8 cm. long; the basal pinnae 1.5-4 cm. long, 0.5-1.3 cm. wide, ovate or ovate-lanceolate, sessile or short-stalked, the petiolule 1-3 mm. long; surfaces bicolored, conspicuously lighter green beneath, rugose above, the upper glabrous or puberulent, the lower pubescent, esp. along the veins; margins evenly serrate, 5-8 teeth per side, slightly revolute; petioles 9-13 mm. long. Heads with outer involucre bracts 7-11 mm. long, 1.5-2 mm. wide, linear-oblongate; rays light purple, 1.7-2 cm. long, 8-10 mm. wide; disc florets purple-tipped; achenes not seen.

Known only from the type locality. Map 6, diamond.

Very little can be said of this rather obscure taxon. A number of characters preserved in the type material (strongly bicolored leaves, slightly revolute margins, rugose texture of the upper surface of leaflets, slender stems) indicate that assigning it varietal rank under *Dahlia australis* is the most reasonable course to follow. This action is taken despite its apparent long geographic disjunction from the center of distribution of *D. australis* var. *australis*.

Collections of other Dahlias species by Frederick Liebmann have been definitely located in northeastern Puebla and adjacent Veracruz. This suggests that the type locality "between San Andres and San Miguel" could be a reference to two small mountain villages located east-northeast of Ixmiquilpan in central Hidalgo. Their location is not far distant from areas known to have been visited by this early collector.

Dahlia australis var. *liebmannii* may be distinguished from other *D. australis* vars. by its smaller leaves (3-8 cm. long) and its rather short petioles (0.5-1.3 cm. long).

22c. ***Dahlia australis* var. *chiapensis*** Sorensen, var. nov.
TYPE: MEXICO: Chiapas: about 9 mi. SE. of San Cristóbal de las Casas along route 190, among boulders and on rocky ledges in zone of pine and oak, about 7500 ft., 23 Sep. 1966, *Melchert, Sorensen, & Crawford* 6458 (Holotype: IA!).

Herba perennis 4.5-7.5(-9.6) dm. alta, foliis aggregatis in caulibus base dense foliatis et internodiis 1-3 cm. longis, vel foliis plus distantibus in caulibus elongatis et internodis 5-15 cm. longis. Caules superne glabri, inferne praesertim ad nodis plus pubescentes. Folia pinnatifida ad pinnata, rarerer bipinnata, 9-18 cm. longa; foliolis 3-5, angusto-ovatis ad rhombico-ovatis, pinnis basilaribus 3-7 cm. longis, 0.8-3 cm. latis, saepe asymmetricis cum lobo singulari sessili prope basin in margine proximali; paginis bicoloribus, dorsaliter pallido-viridibus vel cano-viridibus, praesertim ad nervos pubescentibus, ventraliter vere glabris; marginibus serratis ad dentato-crenatis dentibus in quoque latere 3-6; stipellis, ubi praesentia, ovatis ad rhombicis; petiolis 3.8-9.5 cm. longis. Capitula (1-)2-3 in quoque ramo, erecta ver subcernua; involucri squamis exterioribus effusis vel reflexis sub anthesi, 7-11 mm. longis, 1.8-3 mm. latis. Flores ligulati lilacini, \pm 2.4 cm. longi, 1.5 cm. lati; flores tubulosi 44-52, luteis, interdum apicibus lilacini. Fig. 8.

Rocky slopes and ledges, 7000-8500 ft., in highlands of Central Chiapas. Flowering Aug.-Nov. Map 6, triangles.

MEXICO: CHIAPAS: from about 9 mi. SE. to about 6 mi. W. of San Cristóbal de las Casas along route 190, *Breedlove* 7095 (DS, F, MICH), 7307 (DS, F, MICH), 13762 (DS, MEXU), *Breedlove & Raven* 13412 (DS), *Ghiesbreght* 154 (GH, NY), 558 (GH, MO, NY), *MacDougall s.n.* (F), 365 (US).

The geographic range of *Dahlia australis* var. *chiapensis* is separated from that of var. *australis* in Oaxaca by roughly 250 miles. As with most taxa in the genus *Dahlia*, these varieties are found only at rather lofty elevations. It is important, therefore, to note that the elevations of the area between the distribution centers of vars. *australis* and *chiapensis* are much below those of their known localities. This is easily determined from topographic maps of the area. It is unlikely that this intervening area offers suitable

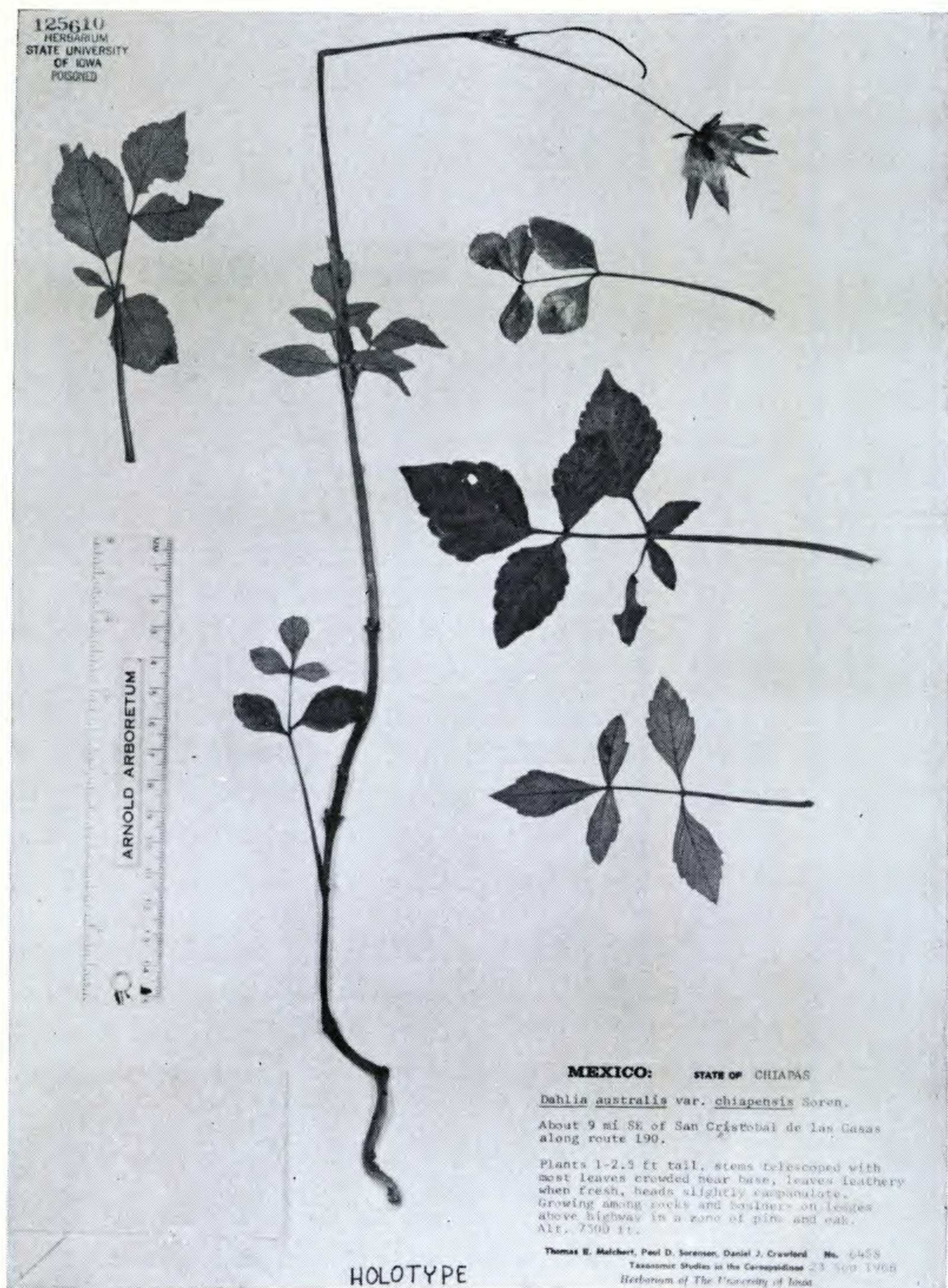


Plate 1422

Fig. 8. *Dahlia australis* var. *chiapensis* Sorensen. Photograph of type (IA), $\times 1/3$.

habitats where other populations of *D. australis* would be found. For these reasons, it is believed that these varieties are effectively isolated from one another by the 250-mile disjunction between their distribution centers. *Dahlia australis* var. *serrator* of Guatemala, a close ally of var. *chiapensis*, is similarly isolated by about 130 miles and the absence of suitable habitats in the area between their distribution centers.

As mentioned in the discussion of *Dahlia australis* the features which mark the varieties of this species are mostly quantitative in nature. Thus, while closely resembling var. *australis* and var. *serrator*, var. *chiapensis* may be distinguished by the following characteristics: (1) mostly compact growth habit with leaves crowded near base; (2) undersurface of leaflets lighter green, rarely markedly lighter or silvery-green; (3) terminal leaflet usually unlobed or divided and without strongly decurrent margins forming a pseudopetiolute; (4) leaflets, esp. the terminal one, often narrowly rhombic-ovate; (5) basal pinnae often asymmetrical with a single sessile lobe near the base of the blade on the proximal edge. Without careful scrutiny these lobes tend to resemble stipels.

22d. ***Dahlia australis* var. *serrator*** (Sherff) Sorensen, comb. & stat. nov. TYPE: GUATEMALA: Dept. HUEHUETENANGO: rocky bushy bank, San Juan Atitán, 8200 ft., 9 Sep. 1934, *Skutch* 1180 (Holotype: GH!).

Dahlia scapigera var. *scapigera* f. *serrator* Sherff, Am. Jour. Bot. 34: 142. 1947. Type: that of *Dahlia australis* var. *serrator*.

Perennial herb, 6.4-12.3 dm. tall. Stems 5-6 mm. diam., glabrous or sparsely pubescent throughout, sometimes slightly scabrous on lower portions; internodes (7-)13-18.5(-28.5) cm. long. Leaves once-pinnate to pinnate-pinnatifid, 12-20 cm. long; leaflets oblong or broadly rhombic-ovate, the basal pinnae 4-8 cm. long 1.3-3.7 cm. wide, sessile or pseudopetiolute, rarely stalked, the terminal leaflet somewhat larger than its companion leaflets; surfaces bicolored, lighter green beneath, the upper rugose, usually glabrous, sometimes slightly pubescent near margins and apices, the lower glabrous to distinctly pubescent, conspicuously veiny; margins regularly serrate to dentate-

crenate, 5-9 teeth per side; petiole (3-)6-10 cm. long. Heads with outer involucre bracts (9-)12-15 mm. long, 2-6 mm. wide, oblong spatulate or more often obovate, strongly tapered toward the base; rays light or rosaceous purple, ovate, 3.4-4 cm. long, 1.4-1.9 cm. wide, acute and denticulate; disc florets 50-53, corolla yellow, tube about 8 mm. long; achenes linear-oblong, 10-11.2 mm. long, 2-2.2 mm. wide.

Rocky banks, ledges and cliffs, 8200-12,100 ft., highlands of southwestern Guatemala. Flowering Aug.-Oct. Map 6, stars.

GUATEMALA: HUEHUETENANGO: in the Sierra de los Cuchumatanes, esp. in the vicinity of San Juan Atitán, *J. R. Johnston* 1975 (F), *Skutch* 1244 (GH), *Steyermark* 50318 (F), 51974 (F). SOLOLA: Los Encuentros, *J. R. Johnston* 986 (F). TOTONICAPAN: woods between Totonicapán and crest of mountains on road to Los Encuentros, *Moore & Cetto* 8193 (BH).

From *Dahlia australis* vars. *australis* and *chiapensis*, var. *serrator* may be distinguished by several characters as follows: (1) plants producing leafy stems (not compact with leaves clustered near the base); (2) midrib of leaflets often tan-colored beneath; (3) terminal leaflets not 3-lobed nor divided, broadly rhombic-ovate; (4) basal pinnae mostly pseudopetiolate, rarely stalked; (5) outer involucre bracts typically rather large, (9-)12-15 mm. long.

23. ***Dahlia sherffii*** Sorensen, sp. nov. TYPE: MEXICO: DURANGO: 24 mi. W. of Durango, 2 mi. S. of El Soldado along route 40, Durango-Mazatlán, among boulders on a steep slope above highway in a plateau region of pine and oak, about 7500 ft., 4 Sep. 1966, *Melchert, Sorensen & Crawford* 6288 (Holotype: IA!).

Herba perennis, 6-13 dm. alta. Caules plerumque glabri, interdum pilis fasciculibus in nodis. Folia pinnata ad bipinnata, 11-27 cm. longa; foliolis primariis 3-7; pinnis basilaribus 6-13 cm. longis, segmentis ultimis ovato-lanceolatis, acutis, basi attenuatis, interdum obliquis; paginis leviter bicoloribus, abaxialiter pallido-viridibus vel cano-viridibus ventraliter leviter pubescentibus, dorsaliter pubescentibus, praesertim in nervis; marginibus dentatis vel grosse serratis, dentibus 2-8 in quoque latere; stipellis plerumque in nodis basilaribus,

interdum in secundis etiam. Pedunculis 5-22 cm. longis; involucri squamis exterioribus effusis vel reflexis sub anthesi, 9-12 mm. longis, 3-4.2 mm. latis, ventraliter, glabris vel adpresso-pubescentibus dorsaliter 5-12-lineatis. Flores ligulati lilacini inferne saepe luteo-maculati, 2.8-4.2 cm. longi, 1.8-2.1 cm. lati; flores tubulosi 56-68, lobis corollae effusis nec reflexis nec revolutis; acheniis 7.1-11.5 mm. longis, 2.2-3 mm. latis. Chromosomatum numerus: $n = 32$. Nomen celebrare Earl Edward Sherff (1886-1966), hominem longe studiosum Coreopsidinae. Fig. 9.

Open or lightly-wooded rocky slopes, ledges, fields, and roadsides, 6000-8500 ft., Sierra Madre Occidental of Chihuahua and Durango. Flowering Aug.-Sep. Map 6, closed circles.

MEXICO. CHIHUAHUA: vicinity of Pilares de Majalca about 40 mi. NW. of Chihuahua City, *Hawkes et al.* 1235 (F), *Le Seur* 24 (CAS, F, GH, MO, TEX, UC), White 2383 (GH); 10 to 16 road mi. S. of Madera on road to Temósachic, *Melchert et al.* 6274 A-C (IA), 6272 pop (IA), *Muller* 3466 (GH, UC); vicinity of Cerro Mohinora, *Gentry et al.* 17993 (US) *Straw & Forman* (MICH); vicinity of Majorachic (Maguarichic), *Knobloch* 1188 (MICH, MO), 5292 (F, MSC). DURANGO: from 34 to 63 road mi. N. of Coyotes RR., *Maysilles* 7512 (F, MEXU, MICH, NY), 7928 (MICH), 8374 (MICH), 8401-A (MICH); 20 km. S. of El Salto at Arroyo del Infierno, *Gordon* 74 (MICH); 24 mi. SW. of Durango along route 40, *King* 3743 (TEX); 36 mi. W. of Durango along route 40, *Melchert & Sorensen* 6031 (IA), 6032 (IA); 10 mi. E. of La Ciudad along route 40, *Melchert et al.* 6304 (IA); 21.7 mi. NE. of El Paraiso along road to El Salto, *Ownbey & Ownbey* 1981 (F, UC, US).

Dahlia sherffii is a new species which was discovered among those taxa formerly treated by Sherff (1955) as part of *D. scapigera* sensu lato (see Table 2). Although geographically separated by about 900 miles, *D. sherffii* seems quite closely related to *D. australis* and its varieties of Oaxaca, Chiapas, and Guatemala as discussed above.

From the pattern of distribution of this species (Map 6, closed circles) one is given the impression that *D. sherffii* is distributed only in two geographic areas isolated from each other by about 250 miles. It is believed this distribution pattern reflects more the distribution of places where collections have been made than the real distribution of the species. This belief is based on first-hand knowledge of the type of habitat of the species and on a survey of

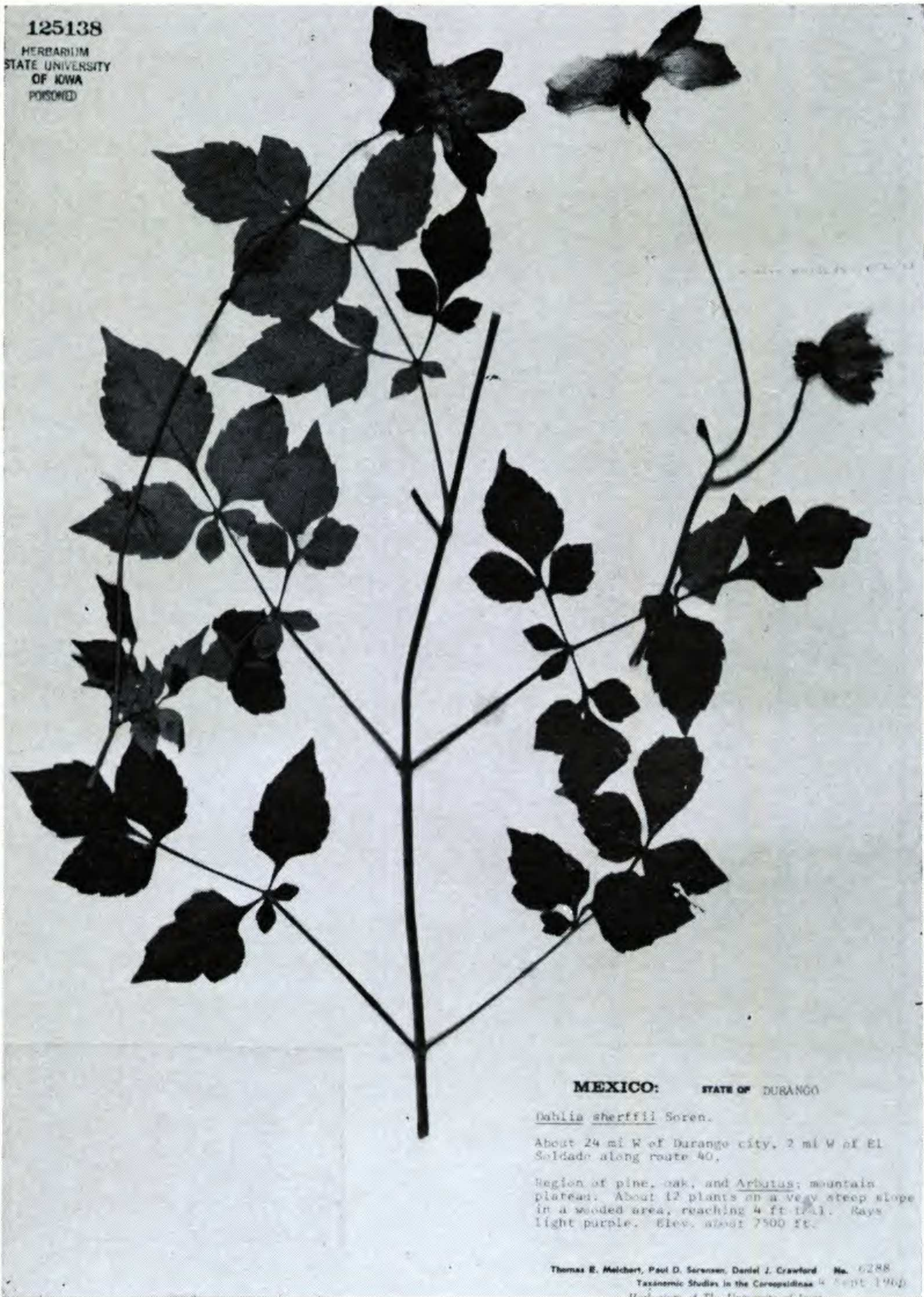


Plate 1423

Fig. 9. *Dahlia sherffii* Sorensen. Photograph of type (IA), $\times 1/3$.

topographical maps of the area. It is seen from these maps that the region between the distribution centers of this species is continuously mountainous and would be expected to provide suitable habitats the entire distance. Moreover, this range of mountains continues for a considerable distance south and north of these distribution centers. It is reasonable, therefore, to expect the present range extremities of *D. sherffii* to be altered as the area becomes more thoroughly investigated.

A certain amount of morphological diversity is displayed in the collections of *D. sherffii* available to me. This variation primarily involves the amount of segmentation of the leaves (from 1-pinnate to bipinnate-pinnatifid), and it correlates partly with the north-south distribution of the species. For example, the leaves on several specimens collected in Chihuahua display a greater amount of segmentation than those collected in Durango. In some cases, however, almost an equivalent amount may be observed between populations within the respective geographic areas. Despite such variation the species is held together by a number of technical characters of its leaves. These are listed below along with the contrasting characteristics which distinguish the closely related *D. australis*, mentioned above, from *D. sherffii*: (1) the upper surface of leaves pubescent (not glabrous), the hairs broadly but evenly spaced between the main veins throughout; (2) the lower surface slightly lighter green (not markedly lighter or silvery green); (3) the texture of leaflets smooth (not rugose); and (4) margins of leaflets flat (not revolute).

24. ***Dahlia scapigera*** (A. Dietr.) Knowles & Westc. Fl. Cab. 3: 113, *pl.* 118. 1839. TYPE. MEXICO: MÉXICO or MICHOACAN: between San Joaquin and Angangueo (presumed to be the Angangueo, Michoacán just W. of the México state boundary), Sep. 1830, *Schiede s.n.* (Holotype: B[?]; Isotype: US!).

Georgina scapigera A. Dietr., in Otto & Dietr. Allg.

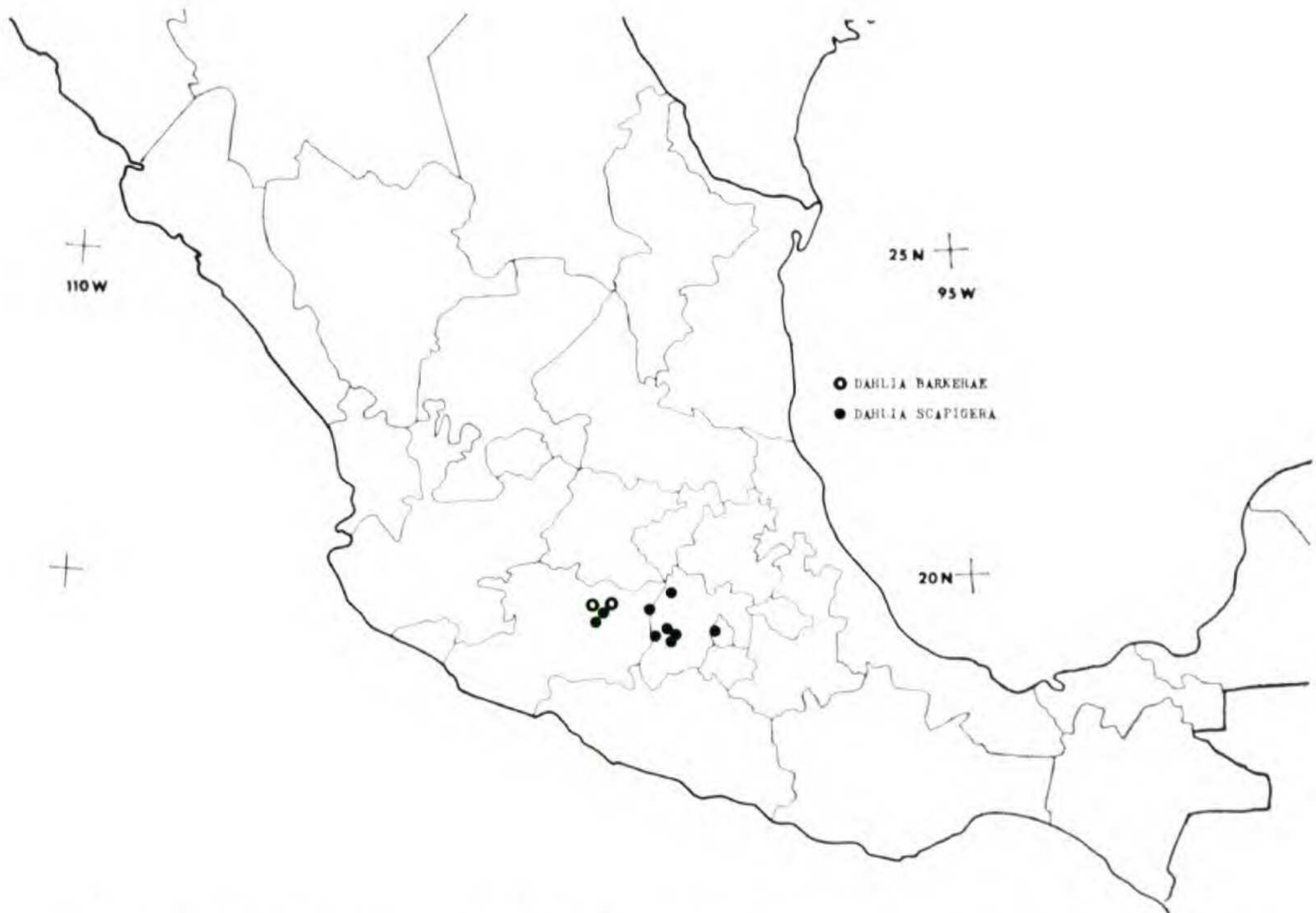
Garten. 1: 197. 1833. Type: that of *Dahlia scapigera*.

Dahlia scapigera var. *typica* f. *typica* Sherff, Am. Jour. Bot. 34: 139. 1947. Type: that of *Dahlia scapigera*.

Herb, 2.8-4.5 (-6) dm. tall, the principal leaves crowded, rosette-like, near the base of the stem. Stem 2-3 mm. diam., glabrous, sometimes with a few hairs at the nodes; internodes 0-4 mm. (in shade forms the internodes may elongate to 2 cm.). Leaves pinnate to pinnate-pinnatifid, rarely almost bipinnate, 6-20 cm. long; leaflets 3-5 (-7), sessile, rarely very short stalked, broadly ovate or ovate-lanceolate, 13-35 mm. long, 4-19 mm. wide; surfaces bicolored, lighter green beneath, the upper rugose, glabrous, the lower salient veiny, glabrous or sometimes a few scattered hairs along the principal veins; margins irregularly ciliolate, the cilia short and stiff, serrate with (1-)3-4 (-5) teeth per side; stipels often present and then at the second node from the base; rachis glabrous except for a few soft hairs at the junction with the leaflets. Heads few, seldom more than one per plant, campanulate, subcernuous; outer involucral bracts erect or ascending (not strongly reflexed) at anthesis, 7-11 mm. long, 1.8-3 mm. wide, linear-oblongate or spatulate, glabrous, dorsally 3-5-lined, inner bracts 12-15 mm. long, 4-6 mm. wide; chaff yellowish, drying to tan; rays whitish-lavender to light-purple, sometimes with a yellow spot at the base, 1.8-3.5 cm. long, 0.8-1.5 cm. wide, ovate, acute or denticulate; disc florets 48-62, yellow, often tinged with purple at tips, 7-8 mm. long, corolla lobes spreading at anthesis, style branches 3-4.2 mm. long, about 0.8 mm. wide, linear lanceolate-attenuate; achenes (from greenhouse plants) 5-7 mm. long, 1.2-2 mm. wide, spatulate or at least linear-oblongate, blackish, minutely pubescent, many-sulcate pappus obsolete or consisting of 2 minute rudiments. Chromosome number, $n = 16$.

Cool, open or lightly-wooded, rocky volcanic slopes, in deep loamy soil, 8600-12,600 ft., from Distrito Federal, just southwest of México City, west to Pico de Tancítaro, Michoacán, and on several high volcanic peaks in between. Flowering July-Sep. Map 7, closed circles.

MEXICO. MEXICO: slopes of Volcán de Toluca, *Balls* 5047 (UC, US), *Barkley et al.* 79 (F, TEX, US), *Melchert & Sorensen* 6119 A-T (IA), 6217 A-B (IA), *Roe et al.* 303 (A, WIS), *Ugent et al.* 1211 (WIS); Distr. of Temascaltepec, Las Cruces, *Hinton* 1039 (GH, MO, US); 9 mi. NE. of San Francisco Cheje along route 130, *King* 3570 (DS, MICH, NY, RSA, TEX, UC, US); woods near Aculco, *Matuda* 28883 (MEXU, NY); Cerro de Jilotepec, *Matuda* 29117 (NY). DISTRITO



Map 7. Distribution of *Dahlia barkeriae* Knowles & Westc., open circles; and *Dahlia scapigera* (A. Dietr.) Knowles & Westc., closed circles.

FEDERAL: Peña de las Charras, *Russell & Souviron* 142 (CAS, US).
 MICHOACAN: summit and slopes of Cerro Tancítaro, *Leavenworth* 273 (F), 688 (F), 1103 (F, GH, MO); Cerro Pelón near Zitácuaro, *Hinton* 13239 (GH, MICH, NY, UC, US); mountains near Pátzcuaro, *Pringle* 4162 (F, GH, ISC, MEXU, MICH, MO, NY, UC, US); Cerro de San Miguel (state not given), *Reiche s.n.* (MEXU).

In a series of articles Sherff (1946, 1947, 1955) gradually enlarged his concept of *Dahlia scapigera* (see Table 2) to include a wide assortment of taxa. To accommodate these he established a number of taxonomic varieties and forms which were brought together in their final version in his revision of *Dahlia* (1955).

I have had the opportunity to observe all but two of Sherff's intraspecific taxa of *D. scapigera* in the field. From these observations and after examining numerous herbarium specimens matched with Sherff's published exsiccatae it was apparent that five rather distinct, and in some cases, unrelated species were included within *D. scapigera*. Briefly, these five species are characterized as

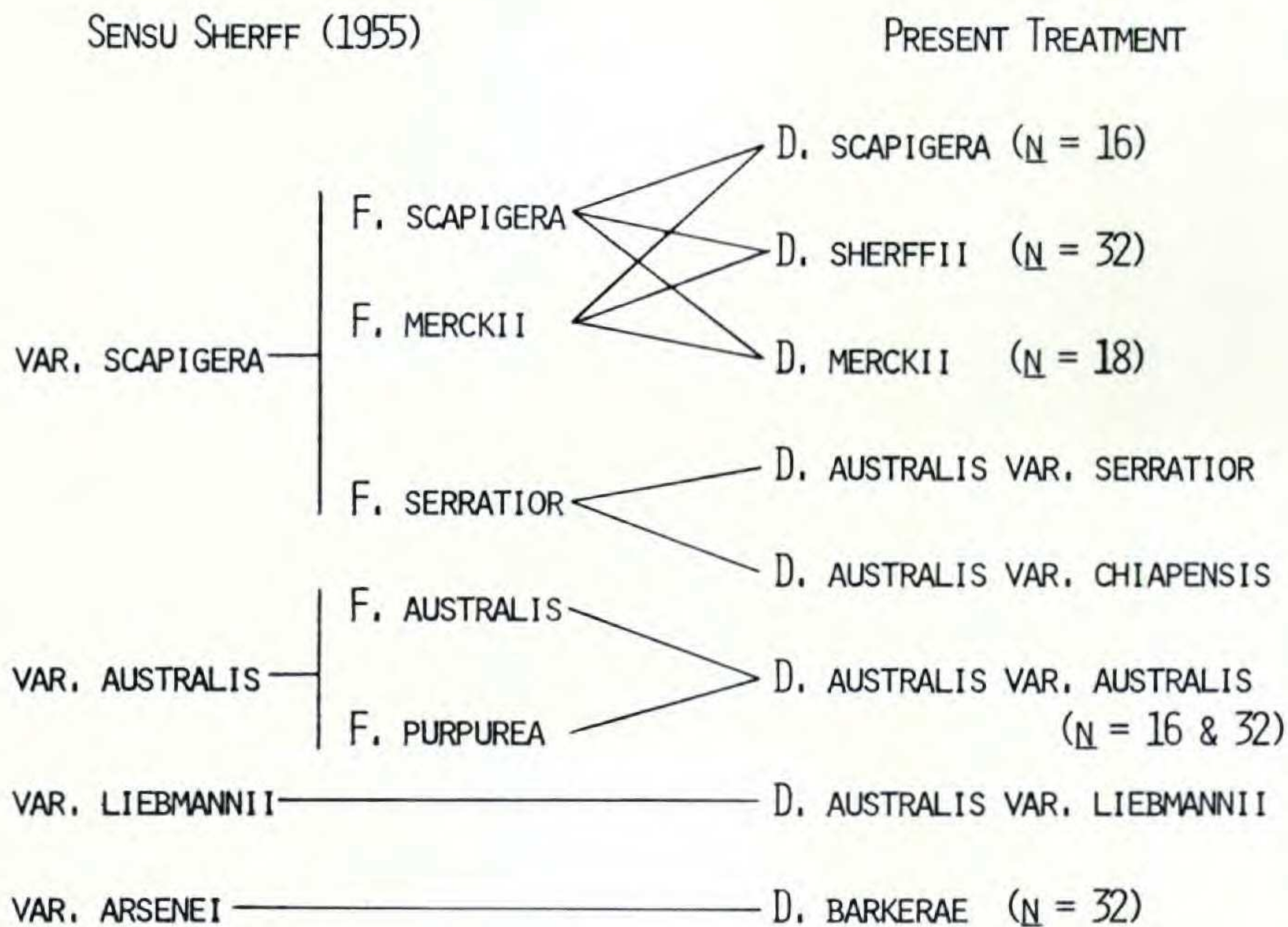


Table 2. Disposition of *Dahlia scapigera* sensu Sherff (1955)

follows: (1) *D. scapigera* sensu stricto, plants of compact growth habit found only at very high elevations on volcanic peaks in south-central México and hardly over 4 dm. tall with mostly 1-pinnate, glabrous leaves (chromosome number, $n = 16$); (2) *D. barkerae*, plants of compact growth habit, resembling *D. scapigera* but with larger and very hairy leaves and leaflets, stems remarkably hairy, ridges and cliffs, vicinity of Morelia, Michoacán (chromosome number, $n = 32$); (3) *D. sherffii* sp. nov., plants 6-13 dm. tall, leafy stems, 1-3-pinnate, pubescent leaves, on rocky ledges and along roadsides in northwestern México (chromosome number, $n = 32$); (4) *D. merckii*, plants 4.5-18.5 dm. tall, leafy portion 1/3 to 1/2 the height, leaves glabrous, mostly bipinnate with pinnules alternate on the rachilla, petioles hollow and fleshy, ledges and open lava fields in south-central México (chromosome number, $n = 18$); and (5) *D. australis* incl. 3 vars., leaves strongly bi-colored, the lower surface much lighter or silvery green, pubescent, upper surface rugose, glabrous, central Oaxaca eastward into western Guatemala (chromosome number, $n = 16 \text{ \& } 32$). These segregates are discussed in turn fol-

lowing their individual taxonomic treatment. Table 2 contrasts and summarizes the present treatment and that of Sherff (1955).

Dahlia scapigera sensu stricto (chromosome number, $n = 16$) is a rather specialized species characterized by its extremely dwarfed, almost rosette-like, growth habit and by its relatively few campanulate flowering heads (usually only 1 or 2 per plant). It seems most closely related to, and possibly was involved in the derivation of, *D. barkerae* (chromosome number, $n = 32$). The ranges of these two species are almost sympatric and morphologically the species have in common a rugose leaf texture, mostly once-pinnate leaves with 3-5 sessile leaflets, a compact growth habit and erect or ascending outer involucral bracts. In addition to its chromosome number, *D. scapigera* is easily distinguished from *D. barkerae* by its fewer heads and by its more nearly glabrous (not conspicuously pubescent) herbage. When seen in the fresh condition, the leaves of *D. barkerae* are a much darker glossy green above.

25. *Dahlia barkerae* Knowles & Westc. Fl. Cab. 2: 28. 1838; & Fl. Cab. 3: 147, pl. 127. 1839. Type: Cultivated in Springfield, near Birmingham, England, 1837, from material collected in the vicinity of Valladolid (now called Morelia), Michoacán, México, 1836-1837, *Barker s.n.* (Holotype: BM [?]).

Dahlia scapigera var. *arsenei* Sherff, Am. Jour. Bot. 33: 508. 1946. Type: *Arsène* 5520 Cerro Azul, vicinity of Morelia, June 1910 (Holotype: GH!; Isotypes: F!, MO!, NY!, US!).

Herb, leaves crowded near base, 3-4.5 dm. tall, or with elongate internodes, then 6-7 dm. tall. Stem 3-4 mm. diam., densely pubescent, the hairs 2-4 mm. long, conspicuously multicellular, glistening white or silvery, flexuous; internodes of compact plants 0.0-1(-6.5) cm., of elongate plants 6-14 cm. (the latter growing in shaded habitats, the former in more open situations). Leaves once-pinnate, 16-29 cm. long; leaflets (3-)5-7, 1-3.5 cm. long, 0.7-2.8 cm. wide, the terminal leaflet much larger than its companion leaflets, broadly ovate to suborbicular, apex acute or subacute, rounded, truncate or even cor-

date at base, sessile or stalked, the petiolules less than 5 mm. long; surfaces bi-colored, the upper dark, shiny green, noticeably rugose (esp. when fresh), glabrous or minutely pubescent along the deeply impressed veins, the lower lighter green or gray-green, densely pubescent esp. along the conspicuous veins; margins ciliolate and coarsely serrate to dentate with 1-5 teeth per side; stipels sometimes present, attached at either the first or second rachis nodes; petiole 2.5-6 cm. long, slightly winged esp. in proximal portion, pubescent; rachis pubescent, the hairs becoming flocculent at the junctions with the leaflets. Heads several on a plant, in 2's and 3's, obliquely erect or slightly nodding, on peduncles 5.5-13 cm. long; outer involucral bracts erect at anthesis, dorsally glabrous, 3-5-lined, 6-6.5 mm. long, 2.5-3 mm. wide, elliptical or obovate, apex subacute or obtuse; inner bracts about 14 mm. long, 4.5-7 mm. wide, purple-lined; rays light purple, 26-32 mm. long, 14-17 mm. wide, ovate, acute or denticulate; chaff membranous, resembling the inner bracts; disc florets 48-60, yellow, the corolla about 8 mm. long, (excluding ovary), its lobes spreading or reflexed at anthesis; style branches 2.7-3 mm. long; achenes not seen. Chromosome number, $n = 32$.

Rocky slopes and ledges, about 7000 ft., within a 20 mile radius of Morelia, Michoacán. Flowering June-Sept. Map 7, open circles.

MEXICO. MICHOCAN: Cerro Azul, vicinity of Morelia, *Arsène* 18 (F), 5520 (GH); Campanario, *Arsène* 6787 (F [photo]); 17 mi. E. of Morelia along route 15, cañon of the Río del Salto, about 8500 ft., *Melchert et al.* 6414 A-C (IA).

Dahlia barkerae was described in 1838 from material cultivated in England following its introduction from "the forests of Valladolid" (the Valladolid now called Morelia in Michoacán) in México. In 1946, Sherff applied the name *D. barkerae* to a group of specimens (*Pringle* 3164) which had been named *D. pubescens* by S. Watson (1891), but now called *D. brevis*. In the same paper (1946) Sherff described the new variety *D. scapigera* var. *arsenei*. The description was drawn from plants collected on Cerro Azul near Morelia. In September 1966 the type locality of *D. scapigera* var. *arsenei* was revisited and plants were found (*Melchert et al.* 6414 A-C) which seemed to be Sherff's variety. Subsequently, however, the original description and accompanying plate of *D. barkerae* were seen and from these it became apparent that Sherff had misapplied the name *D. barkerae* to the species which had

been described as *D. pubescens* by Watson (here referred to as *D. brevis*).

Dahlia barkerae seems closely related to the more widely distributed *D. scapigera*. With the latter it shares a compact habit, mostly once-pinnate leaves with leaflets that have a rugose texture on the upper surface, erect (not greatly spreading or reflexed) outer involucre bracts and slightly pendulous heads. *D. barkerae* may be distinguished from *D. scapigera* by its more branched habit with heads developing mostly in 2's and 3's, by its generally larger leaflets which are dark shiny green above and light green beneath, by its densely pubescent stem and lower leaf surfaces, and by its chromosome number of $n = 32$.

26. ***Dahlia tenuis*** Robins. & Greenm. Proc. Am. Acad. 32: 48. 1896. TYPE: MEXICO: OAXACA: 18 mi. SW. of Oaxaca, 7500-9500 ft., 10 Sep. 1894, *Nelson* 1364 (Holotype: US!; Isotypes: F!, GH!).

Herb 2.5-6 dm. tall. Stem slender, 1.5-4 mm. diam., obscurely many-striate, conspicuously pubescent, the hairs mostly retrorsely curved, more dense at the nodes; internodes 2.5-9.5 cm. long. Leaves pinnate-pinnatifid or pinnate-pinnatisect, 6-11 cm. long; leaflets or primary divisions 5-7, 2-3.5 cm. long, lanceolate, irregularly lobed, pinnatisect or merely toothed with 1-3 teeth per side; surfaces bicolorous, dorsally lighter green and conspicuously veiny, the upper surface pubescent along the main veins, the lower pubescent, esp. along the principal veins; margins obscurely ciliolate, the cilia blunt, irregularly spaced; stipels sometimes present at the basal rachis node; petiole 0.8-4.5 cm. long, longitudinally grooved above, rounded beneath, pubescent, sometimes narrowly winged with the decurrent bases of the leaflets; rachis pubescent, densely so at the junctions with the pinnae, narrowly winged. Heads 1-4 per plant or on each main branch, erect or obliquely erect, slightly campanulate at anthesis; outer involucre bracts reflexed at anthesis, 5-8 mm. long, usually less than 1.0 mm. wide, oblanceolate or spatulate, acute or sometimes obtuse, glabrous, dorsally purple striate with 4-7 parallel lines; inner bracts 12-14 mm. long, 3-8 mm. wide; chaff (in fruit) 11-13 mm. long, 4.5 mm. wide; rays yellow, 1-2.5 cm. long, 6-9 mm. wide, ovate, acute or denticulate; disc florets 17-35, yellow, 3.5-4.5 mm. long, corolla lobes reflexed or revolute; achenes 6-9 mm. long, 1.5-1.8 mm. wide, linear-spatulate, dark gray or almost black, obscurely sulcate, pappus absent or consisting of 2 minute aristae less than 1 mm. long. Chromosome number $n = 16$.

Steep rocky wooded slopes in zone of pine, 5000-8500 ft., from about 40 miles northwest of, to 18 miles southwest of Oaxaca, Oaxaca. Flowering Aug.-Sep.

MEXICO. OAXACA: from about 30 to 39 mi. N. of Oaxaca along route 190, *Iltis et al.* 1290 (MICH, TEX, WIS), *Jackson* 7192 (IA), *Melchert & Sorensen* 6167 A-O (IA), 6179 A-M (IA), 6181 (IA); Clavallinas Mts., *Pringle* 5807 (GH, MEXU, UC); mts. near Telixtla-huaca, *L. C. Smith* 481 (GH).

The relationship of *Dahlia tenuis* to any other known *Dahlia* species is, at present, obscure. Its yellow rays suggest an affinity with *D. coccinea*, but its dwarfed habit, small heads and low number of disc florets are quite different from those of any other species.

27. ***Dahlia coccinea*** Cav. *Icones et Descr. Pl.* 3: 33, *t.* 266.

1796. TYPE: exact place and date of collection not known; originally described by Cavanilles from plants cultivated at the Royal Botanic Gardens, Madrid, which had been grown from seed collected in México and sent to Spain by Vicente Cervantes, Director of the Mexican Botanic Garden, ca. 1789. (Holotype: MA, photo. F!).

Georgina coccinea (Cav.) Willd. *Linn. Sp. Pl. ed. 4.* 3: 2124-2125. 1803. Type: based on *Dahlia coccinea* Cav.

Dahlia crocata Sessé, *Elenchus Hort. Reg. Matriti an.* 1805, *nom. nud.*, cf. *Dahlia crocata* Sessé ex Lagasca below.

Dahlia bidentifolia Salisb. in Wm. Hooker, *Parad. Lond. t.* 19. 1805. Type: based on *Dahlia coccinea* Cav.

Georgina coccinea α *coccinea* (Cav.) Willd. *Hort. Berol.* 2: *pl.* 96. 1809. Lectotype: *pl.* 96, Willd. *loc. cit.* 1809.

Georgina coccinea β *crocea* Willd. *Ibid.* Lectotype: *pl.* 96. Willd. *loc. cit.* 1809.

Georgina coccinea γ *flava* Willd. *Ibid.* Lectotype: *pl.* 96. Willd. *loc. cit.* 1809.

Georgina frustranea α *coccinea* (Willd.) DC. *Ann. Mus. Hist. Nat. Paris.* Type: based on *Georgina coccinea* α *coccinea* (Cav.) Willd. (G-DC, microfiche libraries A-GH).

Georgina frustranea β *crocea* (Willd.) DC. *Ibid.* Type: based on *Georgina coccinea* β *crocea* Willd. (G-DC, microfiche libraries A-GH).

Georgina frustranea γ *flava* (Willd.) DC. *Ibid.* Type: based on *Georgina frustranea* γ *flava* Willd. (G-DC, microfiche libraries A-GH).

- Dahlia crocea* (Willd.) Poir. Lam. Encycl. Suppl. 2: 445. 1812. Type: based on *Georgina coccinea* β *crocea* Willd.
- Dahlia frustranea* (DC.) Ait. f. Hort. Kew. ed. 2, 5: 88. 1813. Type: based on *Georgina frustranea* [vars.] DC.
- Dahlia crocata* Sessé ex Lagasca, Elenchus Pl. Hort. Reg. Matriti an. 1815 et Gen. Sp. Pl. Nov. aut Minus Cognitarum, 30. 1816. Lectotype: description p. 30, Lagasca *loc. cit.* 1816.
- Coreopsis georgina* [var.] *pruinosa* Cass. Dict. Sci. Nat. 18: 443. 1820. Type: based on *Georgina coccinea* [vars.] Willd. and *Georgina frustranea* [vars.] DC.
- Georgina crocata* (Sessé ex Lagasca) Sweet, Brit. Fl. Gard. 3: t. 282. 1829. Type: based on *Dahlia crocata* Sessé ex Lagasca.
- Georgina cervantesii* Lagasca ex Sweet, *op. cit.* II. 1: t. 22. 1829. Lectotype: t. 22, Sweet *loc. cit.*
- Dahlia cervantesii* (Lagasca ex Sweet) DC. Prodr. 5: 494. 1836. Type: based on *Georgina cervantesii* Lagasca ex Sweet (G-DC, microfiche libraries A-GH).
- Coreopsis coronata* Sessé & Moçino, Pl. Nov. Hisp. 147. 1890, *non Coreopsis coronata* L. (1793). Lectotype: description p. 147, Sessé & Moçino *loc. cit.* 1890.
- Dahlia pinnata* var. *cervantesii* (Lagasca ex Sweet) Voss in Vil-morin's Blumengart. 1: 489. 1894. Type: based on *Georgina cervantesii* Lagasca ex Sweet.
- Dahlia pinnata* var. *coccinea* (Cav.) Voss *Ibid.* Type: based on *Dahlia coccinea* Cav.
- Dahlia pinnata* var. *gracilis* (Ortgies) Voss *Ibid.* Type: based on *Dahlia gracilis* Ortgies.
- Coreopsis crassifolia* Sessé & Moçino, Fl. Mex. ed. 2: 194. 1894. Type: Sessé, Moçino, Castillo & Maldonado 2926 (Holotype: MA; Isotype: F!).
- Dahlia chisholmii* Rose, Proc. U.S. Nat. Mus. 29: 439. 1905. Type: *Chisholm s.n.* near Arcelia, Guerrero, México (Holotype: US!; Isotypes: US!).
- Dahlia popenovii* Safford, Jour. Washington Acad. 9: 369, fig. 3. 1919. Type: *Popenoe 682*, Dept. Zacatepequez, Guatemala (Holotype: US!).
- Dahlia coronata* Hort. ex Sprague, Bull. Misc. Info. Kew (Kew Bull.) 1929: 53. 1929. Type: Sprague cited no specimens in his treatment of this species, however, Sherff (1947) states there are at K four sheets of the Sprague study material, from plants cultivated at the John Innes Institution, Merton, England (Lectotype: K).
- Dahlia gentryi* Sherff, Am. Jour. Bot. 29: 332. 1942. Type: *Gentry 6275*, Sinaloa, México (Holotype: F!; Isotypes: DS!, GH!, MICH!, MO!, NY!).

Dahlia coccinea var. *steyermarii* Sherff, *Ibid.* 31: 280. 1944; op. cit. 33: 508. 1946. Type: *Steyermark 50341*, Dept. Huehuetenango, Guatemala (Holotype: F!).

Dahlia coccinea var. *palmeri* Sherff, *Ibid.* 33: 508. 1946. Type: *Edw. Palmer 494*, vicinity of Durango, Durango, México (Holotype: US [2 sheets]!; Isotypes: F!, GH!, MO!, NY!).

Dahlia coccinea var. *coccinea* (Willd.) Sherff, *Ibid.* 34: 149. 1947. Type: based on *Dahlia coccinea* Cav. and *Georgina coccinea* [vars.] Willd.

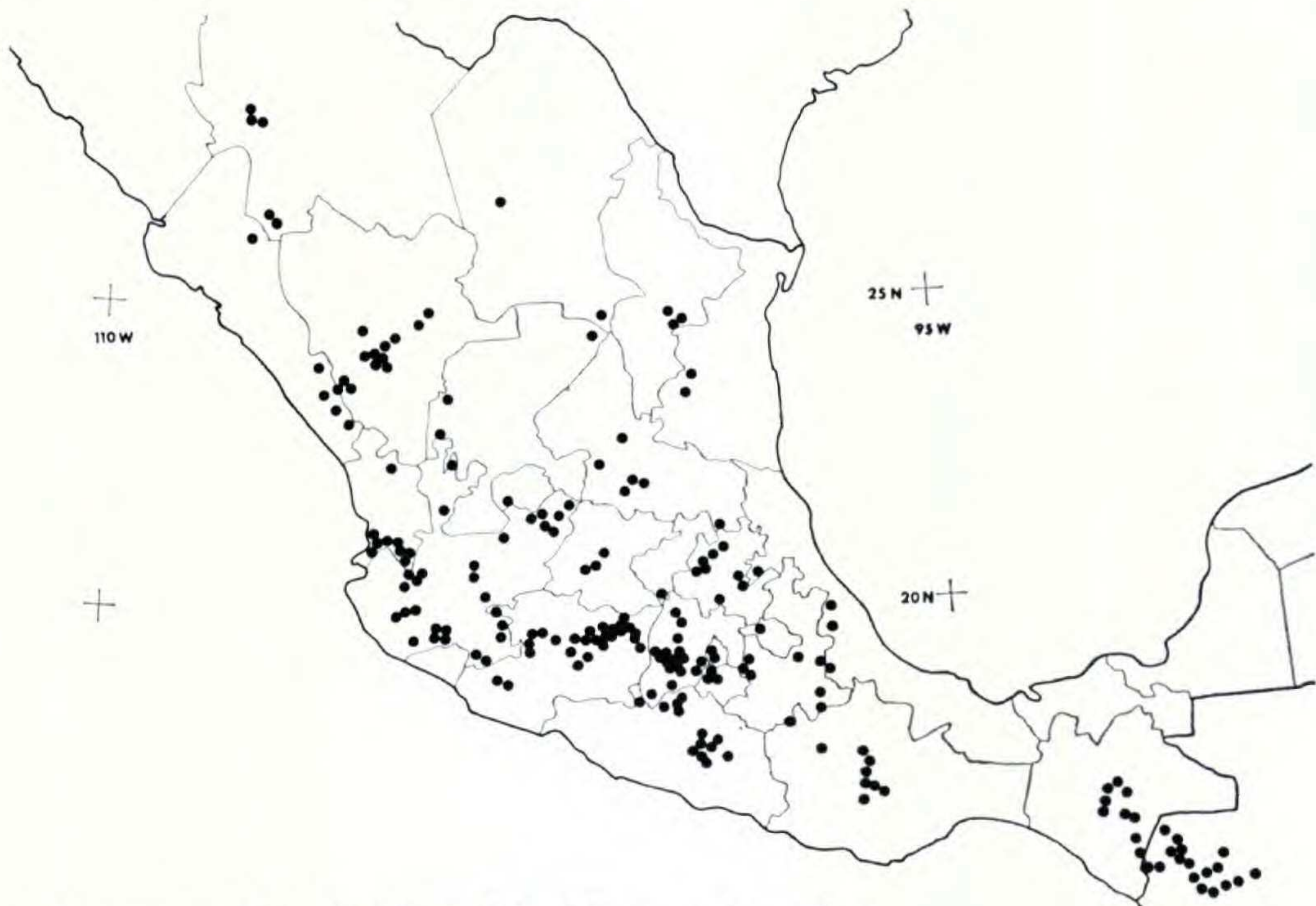
Dahlia coccinea var. *gentryi* Sherff, *Ibid.* 34: 152. 1947. Type: based on *Dahlia gentryi* Sherff.

Herb 4.5-30 dm. tall. Stems usually unbranched in the flowering portion, 2-25 mm. diam., glabrous to densely pubescent esp. at the nodes, sometimes conspicuously glaucous, variously colored green to purple when fresh; nodes usually septate or incompletely so; internodes hollow, rarely solid, 2.5-30 cm. long. Leaves opposite or if whorled then with 3 per node, extremely variable from simple and unlobed to tripinnate, 12-35 cm. long including petiole; primary leaflets 3-11, sessile or petiolulate; basal pinnae 4.5-16 cm. long, its basal pinnule (of 2- or 3-pinnate leaves) 1.8-7 cm. long, terminal segment of leaves, pinnae and pinnule commonly slightly larger than its companion leaflets; ultimate segments broadly ovate to ovate-elliptical or narrowly ovate-lanceolate, rarely slightly obovate, apices usually acute or slightly acuminate bases usually tapered, sometimes rounded, truncate, and even slightly cordate; surfaces usually bicolored, lighter green or gay-green beneath, the upper glabrous or pubescent, sometimes coarsely scabrous, the lower rarely almost glabrous, usually conspicuously hairy along the veins; margins ciliolate, the cilia usually short and very stiff, infrequently longer and flexuous, variously crenate-dentate to coarsely or finely serrate with (1-)2-14 teeth per side; petiole grooved above, crescent-shaped in cross-section, sometimes very narrowly winged, glabrous or pubescent, 1-11 cm. long; primary rachis glabrous or pubescent, mostly with a conspicuous cluster of hairs at the junctions with the primary pinnae, often grooved above, sometimes winged, especially in the distal portions; stipels occurring irregularly, when present then usually at the second rachis node, simple to compound, sessile or stalked. Heads usually in 2's and 3's, erect or obliquely erect, on peduncles 2-30 cm. long; outer involucre bracts spreading or reflexed at anthesis, variously ovate to obovate or spatulate, usually obtuse but sometimes long acuminate-attenuate, 6-15 mm. long, 3-7 mm. wide, dorsally several to many-lined, occasionally reticulate veiny, glabrous, ventrally glabrous or puberulent, often cross-wrinkled; inner bracts brownish or scarlet throughout or just the tips scarlet, 11-17 mm. long, 3-8 mm. wide; rays 1.6-4 cm. long, 10-18 mm. wide, ovate-elliptical or merely

ovate, acute or denticulate, rarely lacerate at apex, lemon yellow to orange, orange scarlet, or deep blackish scarlet, sometimes variegated yellow and orange in a variety of combinations, dorsally puberulent along the veins, the hairs often gland-tipped, esp. those on the tube of the ligulate florets; chaff at anthesis 10-14 mm. long, 2-7 mm. wide, obtuse, pale greenish-yellow, scarlet or scarlet merely at the tips, disc florets 71-157, yellow or sometimes scarlet tipped, 8-10 mm. long, corolla lobes spreading or erect; style branches linear-lanceolate, flexuous, 4-4.5 mm. long, less than 0.8 mm. wide, achenes linear-oblongate to obovate or spatulate, 8-13 mm. long, 1.8-5.5 mm. wide, gray to black, sometimes black-speckled, usually minutely tuberculate, sometimes obscurely many-striate, of varied dimensions and texture sometimes within the same head; pappus obsolete or consisting of 2 minute rudiments, rarely greatly elongated into fine filiform threads, these very delicate and flexuous, usually deciduous. Chromosome number, $n = 16$ & 32 .

Cliffs, ledges, steep rocky slopes, fields and roadsides, from about 1500 to 11,000 ft. Sinaloa, Chihuahua, Coahuila, Nuevo León, and Tamaulipas in Northern México, south in mountains and plateau regions to southern and southeastern México and Guatemala; reported (H. H. Iltis, personal communication) naturalized in mountainous regions of Peru, should be sought also in other Andean countries of South America. Flowering June-Nov. Map 8.

MEXICO. TAMAULIPAS: E. side of Cerro Linadero, *Meyer & Rogers* 2747 (F, GH, MICH, MO, US), 2900 (BH, F, MO, US); between Marcella and Hermosa, *Stanford et al.* 2624 (NY, TEX, UC, US). NUEVO LEON: mts. in the vicinity of Monterrey and Cerro de la Cebolla, *Muller* 2877 (GH, UC), *Muller & Muller* 238 (F, GH, MEXU, TEX), *R. F. Smith* M612 (TEX). COAHUILA: Buenos Aires, *Kenoyer & Crum* 2833 (GH, MICH); La Casita, *Kenoyer & Crum* 4130 (GH); ledges and banks, Carneros Pass, *Pringle* 3166 (CAS, F, GH, MEXU, MO, MSC, NY, RSA, UC, US). CHIHUAHUA: Sierra Canelo, Río Mayo, *Gentry* 2493 (DS, F, GH, MEXU, MO, UC, US); Cascada de Basascachic, *Hewitt* 149 (GH); Maguarichic (Mojarachic) SW. of San Juanito, *Knobloch* 1270 (MICH, MSC), 5994 (MSC, US). SAN LUIS POTOSI: 6 mi. W. of Ahuacatlán, *Graber* 177 (US), 198 (US); Charcas, *Lundell* 5525 (MICH, US); 25 to 30 mi. E. of San Luis Potosí along route 86, *McGregor et al.* 574 (MSC), 646 (MSC), *Powell* 1144 (TEX). ZACATECAS: Along road to Huejuquilla el Alto, Jalisco, *McVaugh* 17687 (MICH); 13 mi. W. of Sombrerete, *Soderstrom* 747 (MICH, US); 18 km. W. of Concepción del Oro, *Stanford et al.* 601 (DS, GH, MO, NY, UC). DURANGO: 5 to 20 mi. W. of Durango City along route 40, *Melchert et al.* 6280 A-B & *pop* (IA), 6282 (IA), *Waterfall* 12551 (GH, MICH, US); 7-8 m. E. of



Map 8. Distribution of *Dahlia coccinea* Cav.

El Palmito along route 40, *Melchert et al.* 6316 (IA), 6318 A-B (IA); Cañon of the Río Jaral about 15 mi. NW. of Coyotes Station, *Cronquist* 9576 (MEXU, MICH, NY, US, TEX); fields along route 40, 29 mi. NE. of Durango City, *King* 3760 (MICH, NY, TEX, UC, US); at Coyotes Hacienda, 63 road miles WSW. of Durango City, *Maysilles* 7634 (F, MEXU, MICH, US); Ramos to Indé, *Nelson* 4714 (US); 16 mi. W. of El Ciudad along route 40, *Melchert et al.* 6313 (IA); Durango City and vicinity, *Palmer* 494 (F, GH, MO, NY, UC, US); mts. S. of La Purisma, *Shreve* 9182 (GH). SINALOA: Ocurahui, Sierra Suratato, *Gentry* 6302 (DS, GH, MICH, NY, US); 1-2 m. SW. of Sinaloa-Durango border along route 40, *King* 3722 (DS, MEXU, MICH, NY, TEX, UC, US); Yxtagua, *Ortega* 124 (MEXU); near Colomos, *Rose* 1779 (US); Cerro del Perico, San Ignacio, *Salazar* 534 (US). HIDALGO: 15-20 mi. N. of Zimapán in the Barranca de San Vicente, along route 85, *Fearing & Thompson* 62 (TEX), *Melchert & Sorensen* 6206 (IA), *Moore* 3376 (BH, GH), *Straw & Gregory* 1145 (GH, MEXU, MICH, RSA); 4-5 mi. N. of Jacala along route 85, *Moore* 1790 (BH), *Weber & Charette* 11911 (US); 12 mi. W. of Pachuca along route 85, *Melchert & Sorensen* 6203 A-F (IA); 7 mi. S. of Jacala, *Melchert & Sorensen* 6207 & 6207B (IA); 12 mi. S. of Jacala, *Melchert & Sorensen* 6208 (IA); between Zacualtipán and Olotlá, *Moore* 3292 (GH); along route 105 by Río Panotlán, *Moore* 5330 (BH, GH, UC); near Ixmiquilpan, *Rose et al.* 9158 (GH); K-257, N. of Zimapán, *Schnooberger* 8002 (MICH). QUERETARO: 15 mi. SE. of San Juan del Río, *Waterfall & Wallis*

13966 (IA). GUANAJUATO: along road between Guanajuato and Dolores Hidalgo, *Johnston & Ettlenger* 2634A (TEX), *Kenoyer* 2111 (GH), *Moore & Wood* 4787 (BH). JALISCO: slopes and ledges in the Barranca del Río Verde (locally known also as Río Blanco), *Detling* 8512 (MICH), *McVaugh* 17342 (MICH), *Melchert & Sorensen* 6063 A-L (IA), 6066 (IA); slopes of Nevado de Colima (Volcán Fuego), *McVaugh* 13495 (MICH), 13555 (MICH), *Melchert et al.* 6393 (IA), *Urbina s.n.* (MEXU); 5-8 mi. W. of Los Volcanes along road to Puerto Vallarta, *Melchert et al.* 6382 A-F (IA), 6383 (IA); near Guadalajara, *Chisholm s.n.* (MEXU); cliffs of Cerro de Talcozagua, *Iltis et al.* 707 (MEXU, MICH, NY, TEX, WIS); Cerro del Tigre, 3 mi. S. of Mazamitla, *McVaugh* 12967 (MICH), 12972 (MICH); SW. of Ojuelos along road to Aguascalientes, *McVaugh* 16762 (MICH); 15 mi. WSW. of Ojuelos, *McVaugh* 17015 (MICH); E. slopes of Cerro de los Gallos, *McVaugh* 17087 (MICH); SE. slopes of Cerro Gordo above San Ignacio, *McVaugh* 17504 (MICH); barranca 5 mi. SW. of Tecalitlán, *McVaugh* 18129 (MICH); 2 mi. NW. of Tequila, *McVaugh* 18624 (MICH); Cerro del Halo along road to San Isidro, *McVaugh & Koelz* 1250 (MICH); 20 mi. E. of Ixtlán del Río, Nayarit, along route 15, *Melchert et al.* 6335 (IA); near summit of Cerro Etxatlán, *Melchert et al.* 6357 A-I (IA); 8 mi. N. of Ciudad Guzman along road from Sayula, *Melchert et al.* 6391 (IA); 15 mi. S. of Mazamitla along route 110, *Melchert et al.* 6399 (IA); between Mesquitec and Monte Escobedo, *Rose* 2622 (GH, US); between Bolaños and Guadalajara, *Rose* 3018 (US), 3085 (US); 15 mi. SE. of Autlán, *Wilbur & Wilbur* 1967 (MICH, US), 2016 (MICH, US). AGUASCALIENTES: Cerro del Laurel about 10 mi. SE. of Calvillo, *McVaugh* 18423 (MICH). NAYARIT: 9-16 m. W. of Tepic along route 15, *McVaugh* 18927 (MICH), 18938 (MICH), *Melchert & Sorensen* 6327 (IA); along road S. of Tepic to Compostela, *McVaugh* 16422 (MICH), *Melchert et al.* 6328 (IA); 3.5 mi. NW. of Ahuacatlán, *Feddema* 423 (MICH); slopes above lake NE. of Santa María del Oro, *Feddema* 699 (MICH), 730 (MICH); SW. slopes of Cerro Sangangüey, *Feddema* 914 (MICH); 20 mi. W. of Ahuacatlán along route 15, *Melchert et al.* 6330 A-C & *pop* (IA); along road from Tepic to Jalcojotán, *Mexia* 605 (CAS, F, GH, MO, NY, UC, US); between Dolores and Santa Gertrudis, *Rose* 2036 (US). VERACRUZ: San Miguel to La Joya, *Balls* B5491 (UC); Tlalcolulán, near Piletas, *Dodds* 104 (MICH); about one mile from Jalapa, *MacDaniels* 401 (F); 19 mi. W. of Orizaba along route 150 to Tehuacán, *Melchert & Sorensen* 6198 A-E (IA); Zacualpán, *Purpus* 1866 (F, MO, UC, US); Puente de San Miguel, *Rangman* 3425 (US); at W. end of Dam above Tuzpango, *Sharp* 441726 (F). PUEBLA: about 3 mi. N. of Atlixco along route 190, *Melchert & Sorensen* 6152 A-F (IA); Chila-Zapotitlán, *Miranda* 2838 (MEXU); Amozoc, *Pringle* 9631 (GH, US); vicinity of San Luis Tultitlanapa, *Purpus* 3113 (F); near Tehuacán, *Rose & Hay* 10121 (GH, US); Esperanza, *Seaton* 357 (F,

GH, NY, US); Puente del Emperador, *Sharp* 44525 (F); along Tehuacán-Orizaba highway on slopes below Puerto del Aire, *C. E. Smith et al.* 3895 (F, MEXU, US). TLAXCALA: along route 140, 35 mi. E. of Texcoco, *Montgomery & Root* 9033A (MSC). MEXICO: along route 130 from Toluca to Temascaltepec, *King* 3579 (MICH, NY, TEX, UC, US), *Melchert & Sorensen* 6220 A-D (IA), 6221 (IA), 6224 A-B (IA); vicinity of Temascaltepec, *Hinton* 2028 (F, MEXU, MO, NY, US), 7965 (GH), 7999 (F, GH, MO, US), *Matuda* 27706 (NY); Valle de Bravo, *Matuda* 27195 (MEXU), *Melchert et al.* 6431 (IA), *Moore & Cetto* 5482 (BH, GH, UC); vicinity of Ixtapán de la Sal along route 55, *Mick & Roe* 350 (WIS), *Paray* 2769 (MEXU), *Roe & Roe* 1889 (A, WIS); vicinity of Villa Guerrero along route 55, *Melchert et al.* 6490 (IA), *Roe & Roe* 1840 (A, WIS); Santa Fé, Cuajimalpa, *Matuda* 21395 (MEXU, NY), *Salasar s.n.* (MEXU); S. side of Guadalupe dam, *Corzo & Guzman* 9 Aug. 1963 (MICH, TEX, WIS); near Huisquilnango, *Matuda* 21091 (MEXU); Tepotzotlán, *Matuda* 21714 (NY); near Santo Tomás, *Matuda* 27124, (MEXU); Villa de Allende, *Matuda* 27646 (MEXU, NY); near Huehuetoca, *Matuda* 29079 (MEXU); Cerro Jilotepec, *Matuda* 29118 (NY); Real de Abajo near Sultepec, *Matuda* 29289 (NY); Cerro de los Capulines, *Matuda* 31343 (US); 9 mi. S. of Tenango, *Melchert & Sorensen* 6122 A-D (IA); 16 mi. S. of Tenancingo along route 55, *Melchert & Sorensen* 6129 A-C (IA); 7 mi. S. of Atlalcomulco along route 55, *Melchert & Sorensen* 6231 (IA); 1 km. SE. of Cahuacán, *Montoya* 51 (TEX); 8 km. SW. of Luvianos along road to Nanchititla, *Rzedowski* 20735 (MEXU). DISTRITO FEDERAL: Pedregal de San Angel, *Barkely & Paxson* 515 (F, MEXU, MICH, TEX), *Martinez s.n.* 14 Aug. 1959 (MEXU), *Matuda* 19484 (MEXU), *Mexia* 2730 (CAS, MICH, NY, UC); lava beds between México City & Cuernavaca along route 95, *Degener & Degener* 26267 (F), *Matuda* 21357 (NY), 21283 (NY, UC), *Strother* 498 (TEX); near Eslaba (Eslava), *Pringle* 11510 (CAS, F, GH, MICH, US), *Rusby* 378 (NY, US), 379 (NY, US), 380 (NY, US), 381 (NY, US), 382 (NY); pedregal near Ajusco; *Matuda* 19168 (MEXU); Lomas de Chapultepec, *Martinez s.n.* 1 Oct. 1954 (MEXU). MORELOS: near Cuernavaca, *MacDaniels* 281 (F), *Matuda* 21470 (NY); El Tezcal, 9 km. SW. of Tepoxtlán, *Clausen* 313 (MEXU, NY); Valle de Tepeite, *Lyonnet* 2416 (US), about 8 mi. SSW. of Tres Cumbres on road to Zempoala, *Melchert & Sorensen* 6107 (IA); 10 mi. N. of Cuernavaca, *Melchert et al.* 6487 (IA). MICHOACAN: numerous localities between Morelia and Ciudad Hidalgo along route 15, *King* 3613 (DS, MICH, NY, TEX, US), 3614 (DS, MEXU, MICH, NY, TEX, UC, US), 3619 (TEX), *Melchert & Sorensen* 6089 A-G (IA), 6091 (IA), 6095 A-K (IA), 6096 A-K (IA), 6097 (IA), *Melchert et al.* 6412 (IA), 6417 (IA), 6426 (IA), 6427 (IA), *Ugent & Flores* 1712 (WIS); 1745 (WIS); along route 15 E. of Zacapu, *Iltis et al.* 435 (TEX, WIS), *Melchert et al.* 6409 (IA), 6410 (IA); vicinity of Cerro Tancítaro and Apatzingán, *Hinton*

15257 (F, GH, MO), *Leavenworth* 590 (F, NY), 640 (F, GH); district of Coalcomán, *Hinton* 12266 (GH, MICH, NY, UC, US), 15936 (NY), 15954 (NY); along route 37 S. of Uruapán, *King & Soderstrom* 4739 (MICH, NY, TEX, UC, US), *Melchert & Sorensen* 6081 (IA); 5 mi. N. of Pátzcuaro, *Barkley et al.* 2702 (F, TEX); 5.5 mi. N. of San Pedro Jacuro on road to San Andres, *Beaman* 4260 A-C (GH, MSC, TEX); Cerro Santa María, 8-10 km. SW. of Jiquilpán, *Feddema* 200 (MICH), 205 (MICH); cañon 2 mi. N. of Zitácuaro, *Hitchcock & Stanford* 7206 (DS, POM, UC); 12 mi. NW. of Zitácuaro, *King* 3604 (DS, MEXU, MICH, NY, TEX, UC, US); near Cojumatlán, *Melchert & Sorensen* 6073 (IA); 32 mi. E. of Zamora, *Melchert & Sorensen* 6075 A-D (IA); 15 mi. N. of Cherán along route 37, *Melchert & Sorensen* 6076A (IA); 3 mi. S. of Escalante along route 160, *Melchert & Sorensen* 6086 A-K (IA); 6 m. E. of Tuzpán, *Melchert & Sorensen* 6102 (IA); 5 mi. W. of Jacona, *Melchert et al.* 6400 A-B (IA); 6.4 km. NE. of Pátzcuaro on the road to Zurumútaro, *Ugent & Flores* 2115 (WIS). CHIAPAS: in the vicinity of San Cristóbal de las Casas, *Breedlove* 11342 (DS), 11905 (DS), *Melchert et al.* 6459 (IA); along trail from Tenejapa to Paraiso, *Breedlove* 6813 (DS, F, MICH); 3 mi. W. of Huistán, *Breedlove* 12413 (DS); barrio of Tuk, paraje of Matsab, *Breedlove* 12510 (DS, MEXU); along trail from Tenejapa to Colonia San Antonio, *Breedlove* 12798 (DS); Miramar, *Matuda* 785 (MEXU, MICH); Puerto Arriba, *Miranda* 7261 (MEXU); Cerro del Boqueron (Cerro Ovando), *Purpus* 6667 (F, MO, NY, UC). OAXACA: along route 175 N. of Oaxaca to Ixtlán de Juárez, *King* 3511 (MICH, TEX), *Melchert & Sorensen* 6170 (IA), 6172 (IA); vicinity of Cerro Zempoaltepetl, *Hallberg* 1061 (MICH); Monte Alban, *Kenoyer* 1522 (GH); about 24 mi. N. of Oaxaca along route 190, *King* 3520 (TEX); 10 mi. S. of Huajuapán, *Melchert & Sorensen* 6156 A-E (IA). GUERRERO: vicinity of Taxco, *Abbott* 147 (GH), 396 (GH), *Manning & Manning* 531012 (GH); along road from Chilpancingo E. to Tixtla, *Melchert & Sorensen* 6136 (IA), 6143 A-B (IA), 6143 A-B (IA), 6146 (IA); District of Minas, *Hinton* 9221 (GH, MICH, NY, UC, US), *Hinton* 14496 (GH, MO, NY, US); district of Montes de Oca, *Hinton* 11350 (GH, MICH, NY, UC, US); Cañon de Zopilote between Mexcala and Zumpango along route 95, *Moore* 5197 (BH); 3 km. beyond Acahuizotla along road to Acapulco, *Moore & Wood* 4676 (BH, UC); about 24 mi. S. of Chilpancingo along route 95, *Melchert & Sorensen* 6131 A-C (IA); 6 mi. N. of Ocotito along route 95, *Melchert & Sorensen* 6133 A-E (IA); Cañon de la Mano near Iguala, *Rose et al.* 9330 (GH, US). GUATEMALA. BAJA VERAPAZ: 14 mi. N. of Salama along route 5, *King* 3356 (TEX). CHIMATENANGO: near Tecpán, *White* 5264 (F, MICH). HUEHUETENANGO: about 11 mi. S. of Huehuetenango along route 9N, *King* 3390 (MICH, NY, TEX, UC, US); between Sololá and Santa Eulalia, *Steyermark*

49971 (F); between Chemal and Calaveras, *Steyermark* 50341 (F, GH); Cerro Pixpix above San Ildefonso Ixtlahuacán, *Steyermark* 50607 (F, NY); 2/3 of way up Cerro Chiquihui above Carrizal, *Steyermark* 50789 (F); mtns. across river from San Juan Atitán, *Steyermark* 51976 (F). JALAPA: between Jalapa and Montaña Miramundo, *Steyermark* 32864 (F). QUETZALTENANGO: fields along route 1 about 3 mi. E. of Quetzaltenango, *King* 3204 (MICH, TEX, UC). SACATEPEQUEZ: slopes of Volcán de Agua N. of Santa María de Jesús, *Standley* 59373 (F). SOLOLA: along route 1 between Sololá and Panajachel, *King* 3231 (TEX), *Melchert et al.* 6438 (IA). TOTONICAPAN: in San Cristóbal Totonicapán, *Breedlove* 11465 (DS). ZACAPA: ravine along Río Lima between Río Hondo and summit of Cerro Finca Alejandria, *Steyermark* 29613 (F).

Dahlia coccinea is perhaps the most complex species of the genus. Its characteristics are nearly all superlative. It has the greatest geographic range (see Map 8), the greatest amount of variation in its foliar and floral features, perhaps the showiest "flowers," and is the only *Dahlia* which might be called a weed. The great range of variation in nearly all its characteristics, as portrayed in the foregoing description, has not gone unnoticed by previous workers. Sherff (1955), attempting to make some taxonomic "sense" of the species, established the following four varieties:

1. var. *steyermarkii*, simple to irregularly 1-pinnate leaves, usually coarse-textured, stems subvillous or tomentulose.
2. var. *coccinea*, leaves 1- or 2-pinnate, regularly divided, stems glabrous or nearly so.
3. var. *palmeri*, leaves 2- or 3-pinnate, stems robust, reddish-glaucous, ligules orange or scarlet.
4. var. *gentryi*, leaves 2- or 3-pinnate, stems delicate, straw-colored, ligules yellow.

It is my belief that *D. coccinea* is a *single*, very wide-ranging, polymorphic species and that its "varieties" are often merely extreme variants which arise independently within geographically distinct (but not necessarily reproductively isolated) breeding populations. In the course of this study I have encountered these "varieties" in the field and have made certain observations about them and about the species as a whole. These are listed below with certain

facts obtained from subsequent laboratory studies of my collections.

a) The "variety" to which an individual plant belongs, unless its features are extreme, is difficult, if not impossible, to determine.

b) The geographic range of each variety is sympatric with one or more of the other varieties.

c) In several populations two of these varieties (not always the same two) were growing side by side, sometimes with intermediate forms between them (cf. *Melchert et al.* 6318 A & B, 6357 A-E, & 6409).

d) All the varieties occupy more or less the same type of habitat.

e) In most populations ligule color, leaf shape and size, chromosome number, height, and other features vary independently. For example, a population of scarlet rayed plants may have leaves ranging from irregularly-pinnatifid (var. *steyermarkii*) to tri-pinnate (var. *palmeri*) (cf. *Melchert et al.* 6382 & 6383).

f) Although diploid and tetraploid races are sympatric throughout most of the range of the species, the tetraploid races extend farther southeast into Guatemala. In several localities populations of the two races were found within a mile or two of one another but were normally not contiguous except as noted below.

g) In one instance both diploids and tetraploids were found in the same population. These plants were morphologically similar and were found growing within a few feet of one another (cf. *Melchert & Sorensen* 6063 A-F).

h) Many diploids and tetraploids throughout most of the range of the species are morphologically indistinguishable.

i) Several of the populations discovered in remote places and isolated from the main body of the species (cf. *Melchert et al.* 6280 & 6393) turned out to be diploids. All of the tetraploids were found in disturbed areas along roadsides and fields as were also some of the diploids.

Dahlia coccinea, as with most *Dahlia* species, is repro-

ductively self-incompatible. This has been true of five individuals, 3 of them diploids and 2 tetraploids, which I have grown in the greenhouse from tubers collected in México. In cases where this form of barrier to inbreeding prevails a high degree of heterozygosity is maintained in the population and all plants of each generation are, in a sense, "hybrids." Each of these "hybrids" contains two, or the segments of two or more, genomes allowing for a tremendous amount of stored variability. Such reproductive self-incompatibility in combination with a high percentage of heterozygosity provides for a full exploration of the genotypic and phenotypic potential of any given breeding population in *each* generation. Obviously, not every genotype can survive, and the habitat does not seem to be strongly selective in its choice of those which are allowed to survive (items c & d above). In small populations, therefore, there is an abrupt difference from plant to plant in those characteristics used to determine the varieties. Lacking intermediates their identification becomes a relatively simple matter. On the other hand, if this breeding unit or population is very large, the range of variability is more apt to be continuous. Obviously, in such cases it becomes biologically unsound and taxonomically artificial to designate a few of the specimens "varieties" *gentryi*, *steyermarkii* or *palmeri* and then name all the remaining variants *var. coccinea*. Therefore, my argument until now has been from the viewpoint that the extreme variants of *D. coccinea* should not be given formal taxonomic recognition but should be regarded as segments of a broad morphological spectrum.

On the other hand, I do not wish to create the impression that every discrete population of *D. coccinea* is a mass of morphologically diverse individuals. I have observed certain populations in which there is great uniformity. For example, five miles west of Durango, in the general vicinity of the type locality of *D. coccinea* var. *palmeri*, an isolated population was found at the head end of a box canyon. Of those collected (*Melchert et al.* 6280 A, B & pop.), each

plant was morphologically similar with scarlet rays and 3-pinnate leaves, and they fit Sherff's var. *palmeri* quite well. The single chromosome count obtained was $n = 16$. Again, about 12 miles northwest of Pachuca, Hidalgo, a population (*Melchert & Sorensen* 6203 A-F) of the diploid plants was found growing among thorny scrub and cactus plants in a region of semi-desert. All plants had glabrous, bipinnate leaves and unusually large, deep-orange or orange-scarlet ligules. This population was also quite isolated from other populations of *D. coccinea*.

Both of the above examples by themselves possess all of the requirements for varietal status. They are geographically limited, have mutually exclusive morphologic markers and are isolated, at least locally, from the main body of the species. If these populations were all that existed of *D. coccinea* they might even be regarded as distinct species.

It is my opinion that such units with morphologic and geographic uniformity, as described in the above examples, do exist within *D. coccinea*. The problem has been that, until now, the overwhelming majority of the specimens in herbaria are from inhabited areas and from near railroads and along roadsides. What will be needed in order to search out these units is much more collecting from remote, undisturbed and reproductively isolated populations.

The many morphological variants of *Dahlia coccinea* are held together as a species primarily on the basis of their ligule color (item e, above). There is a very limited amount of biochemical evidence in support of this. Five individual plants of *D. coccinea* under greenhouse cultivation from tubers collected in México by *Melchert & Sorensen* during 1965 and 1966 produced heads with ligule colors as follows: 6086, yellow-orange; 6203, deep-orange; 6220, bright scarlet with yellow at base; 6224, yellow-orange; 6318, deep-scarlet. Utilizing 2-dimensional paper chromatography, biochemical profiles of the flavonoid compounds in the ligules of these plants were obtained as follows: the pigments were extracted from freshly collected rays by placing them in a flask with acidified methanol (0.5% conc.

HCl by volume). After 12-20 hours of agitation the extract was condensed and spotted on Whatman No. 3 filter paper. The chromatograms were developed via descending chromatographic techniques. The solvent for the first run consisted of tertiary butyl alcohol: glacial acetic acid: water (3:1:1 v/v) and for the second run in the second dimension, 15% by volume of glacial acetic acid and water. When the chromatograms were dried they were viewed in UV light both with and without ammonia fumes. An essentially identical basic profile involving 8 compounds (3 visible as yellow in daylight, 5 visible only in UV) were found in each sample. An additional compound, probably an anthocyanin (visible as magenta in daylight), was found in varying quantities on some and absent on others.

An identical test was made of the ligules of three other species which produced light purple ligules in various shades. The profile of these was quite unlike that of *D. coccinea* rays.

On the basis of these exceedingly preliminary and qualitative data it is concluded that the varying colors of intact rays of *D. coccinea* heads are due to differing concentrations of anthocyanin. Underlying the variable anthocyanin pigment, however, there is, uniformly present throughout the species, a basic group of 8 compounds. Several of these apparently contribute very little to the visible color of the rays but, interestingly, are strikingly different from the basic profile seen in ligules of the purple-rayed species.

In summary, *Dahlia coccinea* is a wide-ranging, polymorphic species. The species is held together by its ray colors which range from lemon yellow to deep blackish-scarlet and by the absence of clear morphologic discontinuities in the great range of variation displayed by its vegetative parts. For the present, it appears best not to recognize any formal subspecific taxa, but it is expected that eventually some could be established. This must await the accumulation of a much greater amount of information on the morphology, cytology, and geographic distribution of the species and of its various morpho-geographic units.

Doubtful, Excluded and Rejected Names

- Dahlia acutiflora* DC. Prodr. 5: 494. 1836. This name is listed by de Candolle as a synonym for *Dahlia cervantesii* (Lagasca ex Sweet) DC. (i.e. *Dahlia coccinea* Cav.) however, he remarks that the ligule colors range from purple to scarlet which suggests it was of hybrid origin.
- Dahlia astantiaeflora* (Sweet) G. Don in Sweet's Hortus Brit. ed. 3, 353. 1839. This should be regarded as a cultivar.
- Dahlia fulgens* Hort. ex Sweet, Brit. Fl. Gard: 282. 1829. Sweet offers this name as a synonym for *Georgina crocata* (Sessé ex Lagasca) Sweet (i.e. *Dahlia coccinea* Cav.) without reference to its earlier publication. As nearly as I can determine this is its first appearance in the literature.
- Dahlia gigantea* Bull. in Loudon, Ladies' Flower-Garden 2: 6. 1844. *Nomen nudum*.
- Dahlia juarezii* Van der Berg, Gard. Chron. II. 12: 433, fig. 66. 1879. and *Ibid.* 594. 1879. This name has been widely used in reference to all *Dahlia* hybrids which produce revolute rays. As noted in the second reference of 1879 above, the original plant which served as the progenitor of these hybrids may have been referable to *Dahlia coccinea* Cav.
- Dahlia platylepis* A. Brongn. ex Neumann, Rev. Hort. II. 4: 305. 1845. The description accompanying this name is confusing and cannot be related to any known taxon. The height of the plant is given as 3 m. suggesting that it might be referable to a species of section *Pseudodendron* but the petiole measurements given as 10-12 cm. would exclude those taxa.
- Dahlia pubescens* A. Brongn. ex Neumann, Rev. Hort. II. 4: 305. 1845. Apparently Brongniart intended this name to refer to a segregate of *Dahlia platylepis* with the same description applying to both names. The added remarks that *Dahlia pubescens* had more hairy leaf surfaces is no help in relating it to a known taxon.
- Dahlia purpurea* Cav. in Desfontaines, Tab. de l'Ecole

Bot. Mus. Hist. Nat. Paris. 106. 1804. The epithet is that of Thouin (1804) but Desfontaines attributes it to Cavanilles without reference to its publication.

Dahlia pusilla in Herb. Zucc. ex DC. Prodr. 5: 494. 1836.

This name was apparently regarded by de Candolle as a synonym for a horticultural variant of *Dahlia variabilis* (Willd.) Desf. It should be regarded as a cultivar.

Dahlia repens Hartweg in litt. ex Benth. Trans. Hort. Soc. London II. 2: 395. 1840. *Nomen nudum*.

Dahlia repens Hort. ex Verlot, Rev. Hort. 1864: 31. 1864. *Nomen nudum*. It is not known whether there is any connection at all between the *Dahlia repens* referred to by Verlot and the species given the same name by Hartweg above.

Dahlia rosea Cav. Icones et Descr. Pl. 3: 33, t. 265. 1796.

This name has been a source of constant error and, in accordance with the provision of Art. 69, *International Code of Botanical Nomenclature*. 1966, should be rejected. Many authors have considered it a synonym of *Dahlia pinnata* Cav. (or of some nomenclatural equivalent of *Dahlia pinnata*) while others have related it to the "tree-Dahlias". In the original description the phrase "pinnulis secundariis nunc alternis, nunc oppositis" suggests it may be an earlier name for what is treated here as *Dahlia merckii* Lehm. However, later authors such as Thouin and de Candolle who had access to plants grown from the seeds of the original study material of Cavanilles do not mention this trait.

Dahlia royleana Knowles & Westc. Fl. Cab. 3: 186. 1840. Description inadequate.

Dahlia sphondyliifolia Salisb. Trans. Roy. Hort. Soc. 1: 91. 1820. This is a superfluous name apparently offered by Salisbury as a more descriptive epithet for *Dahlia rosea* Cav. noted above.

Dahlia zimapani Roezl in litt. ex Ortgies, Gartenflora 1861: 406, t. 347. 1861. = *Cosmos diversifolius* Otto.

Georgina astrantiaeflora Sweet, Hortus Brit. ed. 2. p. 310. 1830. This should be regarded as a cultivar.

Georgina bipinnata (Cav.) Sprengel, Syst. Veg. 3: 611. 1826. = *Cosmos bipinnatus* Cav.

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